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ABSTRACT

The guide offers a compilation of teacher-developed career education materials which may be integrated with secondary level curriculum in mathematics. Suggested activities and ideas present the following units based on career clusters as they relate to mathematics: construction, communications and media, hospitality and recreation, public service, marine science, health, manufacturing, transportation, and agri-business and natural resources. Activity suggestions for other math-related units are also given including several "silent lectures" emphasizing logical problem solving and units on consumer economics, metrics, computer science, statistics, and other mathematical applications. Objectives, teaching procedure, and related resources and materials are presented for each unit. A 12-page list of suggested local field trip sites and guest speakers is included. (EC)

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CAREER EDUCATION

Learning with a Purpose

SECONDARY GUIDE - VOL. 5

- Mathematics and Career Clusters
- Mathematics Related Activity Suggestions
- Field Trip Sites and Guest Speakers

CE006079

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
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CAREER EDUCATION PROJECT
STATE FAIR COMMUNITY COLLEGE
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FOREWORD

Career education at the secondary level strives to develop the relationship between academic studies and life outside of school, to help each student to personally identify a desired life role, and to make possible the preparation necessary for fulfilling that life role.

There is no set "career education program" to be adopted by all school systems. Rather career education is a concept to be adapted to the needs of each community, each school system.

Nowhere in this guide or in any of the others in this secondary level series is there a definition of career education. So many definitions have been developed that any individual can search for--and find--the one that suits his/her purposes. The activities, ideas, and suggestions herein do reflect the concept as it has been understood and implemented by the contributors.

Our goal in preparing and compiling these materials is to provide an idea bank. You as an educator can select those suggestions that could be easily integrated into your curriculum and enhance its value for your students.

Different contributors have approached this goal with various methods. Briefly stated activity suggestions comprise the bulk of the material. However, in some instances, complete unit or course outlines are included.

Please browse through the materials to find ideas that might be integrated with your on-going curriculum. The volumes in the series and the areas covered in each are as follows:

Volume I--Art
English
Industrial Art
Physical Education
Science

Volume II--Business
Metrics
Special Education

Volume III--Foreign Language
French
German
Spanish

Volume IV--Home Economics

Volume V--Mathematics

Volume VI--Social Studies

Don't limit yourself to only one guide--you may find an idea from another discipline that you can use with only slight adjustments. We hope you enjoy the guide and would be happy to hear any comments you have on it.

Phyllis B. Stuerke
Secondary Specialist
Career Education Project
State Fair Community College
Sedalia, MO 65301

Subject Area(s) Math

Unit(s) Construction Superintendent

Objective(s): To use mathematical concepts as they relate to the career of construction superintendents.

Procedure:
All draftsman's activities such as:
- Reading scales
- Fractions
- Blueprint reading
- Measurements of angles

Use of materials:
- Buying of all construction materials
- Cost of materials
- Compute stress and strain the material will withstand
- Proper concrete mixture

Relating electrical math:
- Finding capacity of conductors
- Finding the resistance of the conductors
- Use of Ohm's Law
- Determining fuse sizes

Related activity suggestions:

Field trip to a construction site, a power generating plant, a technical drafting class.

Design and build a float for a parade, scenery for a school play, bleachers.

Resources and Materials:
Textbooks in math and physics
Engineering handbooks

Films: "Roof of Sky," American Society for Metals, Metals Park, OH 44073
"Bridging Marble Canyon," American Institute of Steel Construction, 101 Park Ave., New York, NY 10017, 16mm, black and white, sound, 10 min. Pay return postage, order in advance and show date.
"Reach for the Sky," 16mm, color, sound, 16 min. Order well in advance, pay return postage.

Evaluation:

Comments on use:

Siebert McDaniel

Subject Area(s) Math

Unit(s) Bricklayer

Objective(s): To use mathematical concepts as they relate to the career of bricklayer.

Procedure:
Measurements:
- Finding volume
- Linear measures
- Weight measures

Cost estimate:
- Cost of materials
- Cost of tools
- Cost of labor
- Estimate the total cost of job

Study of angles:
- The right angle
- The straight angle
- Figuring size of angles

Related activity suggestions:

Invite a professional bricklayer.

Visit a construction area where brick work is being done.

Measure and find number of bricks for a certain section of an existing wall; figure the cost of building this section.

Resources and Materials:
Textbooks of general math, geometry and trigonometry

Films: "Clay and Craftsman," 16mm, color, sound, 20 min. Book 3 weeks in advance, pay return postage.
"Man and Masonry," 16mm, black and white, sound, 15 min. Book 3 weeks in advance, pay return postage. Structural Clay Products Institute, 1520 18th St., NW, Washington, DC 20036

Write to: Associated General Contractors of America, Inc., 1957 E. St., NW, Washington, DC 20006
Bricklayers, Masons and Plasterers, International Union of America, 815 15th St., NW, Washington, DC 20005

Evaluation:

Comments on use:

Siebert McDaniel

Subject Area(s) Math

Unit(s) Plumber

Objective(s): To use mathematical concepts as they relate to the career of plumber.

Procedure:

Pipe fitter
  Measurement of inside and outside diameters
  Compute capacity of pipe
  Length and pitch of threads on pipe
  Study formula used in finding liquid pressure

Related activity suggestions:

Invite the science teacher to speak to the class.

Inspect the school heating and plumbing layout.

Look at drawings produced by the drafting department.

Compute the capacity of a storage tank used by the city water department. Find the water pressure exerted by the stand-pipe of the water department.

Resources and Materials:

Textbooks in both math and physics
Inspect the school heating and plumbing layout, look at drawings produced by the drafting department.

Films: "A Drink for Judy" and "Barrier" 16mm, color, sound, 13½ min.
"Against Disease" 16mm, color, sound, 15 min.
Both from the National Association of Plumbing-Heating-Cooling Contractors, 1016 20 St., NW, Washington, DC 20036

Write to: United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry of the U. S. and Canada, 901 Mass. Avenue, NW, Washington, DC 20001

Evaluation:

Comments on use:

Siebert McDaniel

Subject Area(s) Math

Unit(s) Draftsman

Objective(s): To use mathematical concepts as they relate to the career of draftsman.

Procedure:

Architect's work:
- Use of scale instruments
- Study of fractions
- Study of angles

Mechanical drawing:
- Use of engineer scale
- Find area of surfaces
- Use of radius, diameter, and circumference of the circle
- Use of the decimal system

Materials:
- Stress and strain a material can absorb
- Cost

Related activity suggestions:

Visit the drafting department of the schools or have the drafting teacher talk to the class.

Visit a construction site.

Invite a professional architect and/or draftsman to talk to the class.

Resources and Materials:

Textbooks used in the class

Write to: American Institute for Design and Drafting, 770 S. Adams Road, Suite 110, Birmingham, MI 48011
American Federation of Technical Engineers, 900 F St., NW, Washington, DC 20004
American Institute of Architects, 1735 New York Avenue, NW, Washington, DC 20006

Films: "A Is for Architecture," 16mm, color, sound, 30 min. Borrower pays transportation charges. Canadian Consulate Film Library, 310 S. Michigan Ave., Chicago, IL 60604
"Principles of Scale Drawing," 16mm, black and white, sound, 11 min., rental fee of $2. Department of Audiovisual Extension, Univ. of Minnesota, 2037 University Ave., SE, Minneapolis, MN 55455

Evaluation:

Comments on use:

Siebert McDaniel

Subject Area(s) Math

Unit(s) Carpentry

Objective(s): To use mathematical concepts as they relate to the career of carpentry.

Procedure:

Reading scales:
- Use of architect scale
- Reading carpenter square
- Fractional readings of scale
- Measurement of angles

Use of materials:
- Buying of materials
- Computing boardfeet
- Size and length of fasteners
- Reading scaled drawings

Tools:
- Weight and measurement of tools
- Computing electrical use

Costs:
- Estimating costs of materials
- Estimating costs of labor
- Figuring loss and profit

Related activity suggestions:

Visit a construction site.

Invite a speaker from a local union.

Visit the industrial arts area at school.

Resources and Materials:
Textbooks

Films: "Building a House," 16mm, black and white, sound, 12 min. Pay rental fee and postage. Encyclopedia Britannica, Educational Corp. Chicago, IL 60611
"ABC of Hand Tools," 16mm, color, sound, 18 min. Pay return postage and insurance. General Motors Corp., Detroit, MI 48202

Write to: Associated General Contractors of America, Inc., 1957 E. Street, NW, Washington, DC 20006
United Brotherhood of Carpenters and Joiners of America, 101 Constitution Avenue, NW, Washington, DC 20001

Evaluation:

Comments on use:

Subject Area(s) Math and Communications

Unit(s) Telephone Service Representative

Objective(s): To use mathematical concepts as they relate to the career of telephone service representative.

Procedure:

General math:
- Complete use of fractions
- Knowledge of the metric system
- Knowledge of the linear measurements

General Bookkeeping:
- Complete information in accounting
- Figuring basic business costs
- Computing taxes

Related activity suggestions:

Invite a telephone company representative to speak to the class.

Keep record of telephone costs in the home, in the school.

Use the school intercom system.

Resources and Materials:

Textbooks in both general math and science

A basic general business textbook

Bulletin from local telephone company

Write to: Communications Workers of America, 1925 K Street, NW, Washington, DC 20006

Alliance of Independent Telephone Unions, Room 302, 1422 Chestnut St., Philadelphia, PA 19102

National Telephone Cooperative Association, 2100 M St., NW, Washington, DC 20037

Communications Workers of America, 1925 K St., NW, Washington, DC 20006

International Brotherhood of Electrical Workers, 1200 15th St., NW, Washington, DC 20005

Pamphlets: "Operator," "Here is Tomorrow," "The Telephone in America," "The Telephone at Your Command"

Evaluation:

Comments on use:

Subject Area(s) Math and Communications

Unit(s) Telephone Service Representative, p. 2

Objective(s):

Procedure:

Resources and Materials:
Films: "Your Voice and the Telephone," 16mm, color, sound, 7 min.
"Pattern for Communication," 16mm, color, sound, 26½ min. Pay return postage.
Both from Bell office.

Evaluation:

Comments on use:

Siebert McDaniel

Subject Area(s) Math and Communications

Unit(s) Telephone Installation and Maintenance

Objective(s): To use mathematical concepts as they relate to the career of telephone installation and maintenance.

Procedure:

Electrical circuitry:
- Figure carrying capacity of conductors
- Reading of meters and instruments
- Computing from the readings of the measuring instruments

Tools and materials:
- Be able to convert reading in the English system to the metric system
- Know the decimal system
- Converting of fractions to decimals

Related activity suggestions:

Tour the telephone company

Accompany a local telephone employee to install a phone.

Install phone and doorbell systems for the school's stage productions.

Construct a transformer in a shop class.

Build a communication system for the science fair.

Resources and Materials:

Textbooks in both math and science

Films: "Science Behind Speech," 16mm, color, sound, 8 min. "Talking of Tomorrow," 16mm, color, sound, 10 min. "Here is Tomorrow," 16mm, color, sound, 28 min. Each of these three films may be ordered from the nearest Bell system business office.

Write to: Communications Workers of America, 1925 K St., NW, Washington, DC 20006
Alliance of Independent Telephone Unions, Room 302, 1422 Chestnut St., Philadelphia, PA 19102

Evaluation:

Comments on use:

Siebert McDaniel

Subject Area(s) Math and Communications

Unit(s) Print Shop Operator

Objective(s): To use mathematical concepts as they relate to the career of print shop operator.

Procedure:

Layout work:
- Reading of all scales
- Make sealed drawings
- Knowledge of fractions
- Knowledge of type size

Bookkeeping:
- Financial records
- Figure operating costs
- Know how to figure percentage
- Profit margin

Materials:
- Cost of machines
- Estimate cost of operation of each machine
- Figure weights of materials
- How to figure type size and spacing

Related activity suggestions:

Tour a printing business.

Talk to press operators at local newspaper plant.

Attend art displays.

Work on school paper.

Design posters and signs for school functions.

Resources and Materials:
Textbooks in art and math

Films: "Basic Principles of Printing," 16mm, color, sound, 23 min. Pay return postage. "I. S. Berlin Success Story," 16mm, color, sound, 30 min. Pay return postage, book 6 weeks in advance.
Both films are available from The Miehle Co., 2011 Hastings St., Chicago, IL 60608

Evaluation:

Comments on use:

Subject Area(s) Math and Communications

Unit(s) Television Director

Objective(s): To use mathematical concepts as they relate to the career of television director.

Procedure:

General:
- Complete knowledge of fractions
- Complete usage of percentage
- How to read all measuring scales
- Kinds and sizes of angles

Materials and equipment:
- Figure cost of stage materials
- Estimate cost of stage equipment
- Figure the cost of a stage production
- Read a scaled diagram
- Make a scaled drawing
- Diagraming a setting to a scaled proportion

Related activity suggestions:

Arrange stage for plays.

Build stage props.

Construct floats.

Assist in the school visual-aid department.

Arrange and set up an art display.

Assist in the direction of school plays.

Assist in the direction of the school music productions.

Resources and Materials:

All school textbooks in math

Settings of all television programs

Bulletins and magazines from broadcasting stations

Your Career in TV and Radio, Simon & Shuster Inc., One West 39th St., New York, NY 10018 ($13.95)

Into Television, Pergamon Press, Maxwell House, Elmsford, NY 10523 ($2)

Films: "Creative Attitude," 16mm, black and white, sound, 27 min. Pay return postage. General Motors Corp., General Motors Building, Detroit, MI 48202

"Where the Rainbow Ends," 16mm, color, sound, 17 min. Pay return postage, book 1 month in advance. Channel Master, Motion Picture Division, Ellenville, NY 12428

Write to: National Assoc. of Broadcasters, 1771 N St., NW, Washington, DC 20036

NBC, INc., 30 Rockefeller Center, New York, NY 10020

Evaluation:

Comments on use:

Siebert McDaniel

Subject Area(s) Math and Communications

Unit(s) Typewriter Repairman

Objective(s): To use mathematical concepts as they relate to the career of typewriter repairman.

Procedure:

Fractions:
  Conversion of fractions to decimals
  Good knowledge of the four math fundamentals of fractions

Electric motors:
  Know how to compute amperage, resistance and voltage by Ohm's Law
  Know how to compute the carrying capacity of a conductor

Tools and materials:
  Fractional sizes of screws and bolts
  Area and diameter of wire
  Estimating cost of materials and labor

Related activity suggestions:

Visit a typewriter repair shop.

Make a transformer for the doorbell system on stage.
Make minor repairs on the school typewriters.

Mix a cleaning fluid in the science lab.

Build a scale model of a motorized device.

Demonstrate the principles of the six simple machines.

Resources and Materials:
Textbooks of math and science used in the school
Home mechanics textbook used in the industrial arts dept.
Any good electrician's handbook

Care and Repair of Your Typewriter, Bobbs-Merrill Co., Inc., 4300 W. 62nd St., Indianapolis, IN 46268 ($1)
Office Machine Operator, Arco Pub. Co., 291 Park Ave., South, New York, NY 10036 ($4)

Films: "The Common Denominator," 16mm, color, sound, 12½ min. Pay return postage, book 1 month in advance. Modern Talking Picture Service, 2323 New Hyde Park Road, New Hyde Park, NY 10040

Evaluation:

Comments on use:

Siebert McDaniel

Subject Area(s) Math and Recreation

Unit(s) Camp Director

Objective(s): To use mathematical concepts as they relate to the career of camp director.

Procedure:

Bookkeeping
- Must be competent in business arithmetic
- Prepare a salary schedule
- Know how to prepare a budget
- Know how to prepare a tax income form
- Know the keeping of time sheets

Materials and equipment
- Know about discount buying
- Have a knowledge as to cost of materials and equipment
- Know how to figure space requirements for activities
- Know how to read a scale diagram
- Know how to compute the amount and cost of electrical energy

Related activity suggestions:

Sketch a diagram of a camp area and designate the areas for each activity.

Prepare a budget for a local scout organization.

Be an assistant leader in a local scout troop.

Assist in the planning and execution of the local recreation program.

Assist in the measurement and layout of the activities section of the school playground.

Resources and Materials:

Textbooks used in general business and accounting

Handbooks on the requirements of activities

Bulletins on filing tax forms from revenue offices

Bulletins from the many camping associations

Scout Handbooks

Camping Today, Rand-McNally & Co., 10 East 53rd St., New York, NY 10022 (cost $3.95)

Program Activities for Camps, Burgess Pub. Co., 426 S. 6th St., Minneapolis, MN 55415 (cost $5)

Films: "Camping--Quebec" 16mm, black and white, sound, 15 min. Pay return postage, book 8 weeks in advance.
Quebec Gov. House Rockefeller Plaza, 17 West 50th St.,
New York, NY 10020
"The Westward Way" 16mm, color, sound, 22 min. Pay return postage, book 2 weeks in advanc.
Heinz U. S. A., P.O. Box 57,
Pittsburgh, PA 15230

Evaluation:

Comments on use:

Subject Area(s) Math

Unit(s) Camp Director, p. 2

Objective(s):

Procedure:

Resources and Materials:

Write to: American Camping Association, Bradford Woods, Martinsville, IN 46151
National Camping Association, 353 W. 56th St., New York, NY 10019
Association of Private Camps, 55 W. 42nd St., New York, NY 10036

Evaluation:

Comments on use:

Siebert McDaniel

Subject Area(s) Math and Recreation

Unit(s) Park Ranger

Objective(s): Assist with local boy scout organization. Identify the woods used in the industrial arts shop. Measure and compute the number of acres in the school ground.

Procedure:

Weights and measurements:
- Know the table of linear measurements
- Know the table of weights measurements
- Figure speed of light and sound
- Compute size of angles
- Compute size of area in terms of square units
- Convert temperature readings from one scale to another
- Figure the number of board feet in a tree
- Estimate distances by use of the compass

Related activity suggestions:

Tour a national or state park.

Visit a zoo.

Assist local boy scout organization.

Identify the woods used in the industrial arts shop.

Measure and compute the number of acres in the school ground.

Resources and Materials:

All textbooks in math and science

Pamphlets from the National Park Service

Visual Aids: "The Endless Forest," 16mm, color, sound, 28 min. Modern Talking Picture Service, 1212 Ave. of the Americas, New York, NY 10036

"Yosemite-Valley of Light," 16mm, color, sound, 20 min. Pay return postage. Ford Motor Company, The American Road, Dearborn, MI 48121

Write to: National Park Service, U. S. Dept. of the Interior, Washington, DC 20240

Evaluation:

Comments on use:

Siebert McDaniel

Subject Area(s) Math and Recreation

Unit(s) Director of Recreation

Objective(s): To use mathematical concepts as they relate to the career of director of recreation.

Procedure:

Plans facilities:
- Reading of all scales
- Complete background in fractions, decimals and percentages
- Computing cost of heating and lighting of facilities
- Estimate cost of materials
  - Board feet measurement
  - Cubic yards of concrete needed
  - Amount of roofing material needed

Budget:
- Figure cost of utilities
- Figure wages of employees
- Figure overhead
- Figure cost of maintaining area
- Figure supplies and equipment

Related activity suggestions:

Invite a recreation director to speak to the class.

Visit a recreation center.

Assist in playground activities at the school.

Assist in the construction of a summer community recreation program.

Be a squad leader in the physical education class.

Resources and Materials:
Textbooks in the Administration of Public Recreation Bulletins from the state and federal government

Write to: National Recreation and Park Assoc., 1700 Pennsylvania Ave., NW, Washington, DC 20006
National Education Association, 1201 16th St., NW, Washington, DC 20036

Films: "The Fitness Challenge," 16mm, color, sound, 28 min. Pay return postage, book in advance. American Osteopathic Assoc., Order Department, 212 E. Ohio St., Chicago, IL 60611
"Swim and Stay Fit," 16mm, color, sound, 4½ min. Pay return postage. American Red Cross, local chapter

Evaluation:

Comments on use:

Subject Area(s) Math and Recreation

Unit(s) Hobby Shop Manager

Objective(s): To use mathematical concepts as they relate to the career of hobby shop manager.

Procedure:

General business:
- Keeping record of income and expenditures
- Figure profit and loss
- Making change to the customer for items purchased

General math:
- Complete knowledge of fractions
- Complete knowledge of linear measurement
- Complete knowledge of area measurement
- Complete knowledge of volume measurement
- How to figure overhead costs
- Use of percentage as used in mark-ups and discount
- How to figure payments on the installment plan
- How to read all types of measuring scales

Related activity suggestions:

Visit to the hobby and craft center.

Invite a recreation director to class.

Invite the arts and craft teacher.

Figure cost of projects made in the school shop.

Plan and construct a display in the art department.

Get a part-time job in the hobby shop retail outlet.

Resources and Materials:
Textbooks used in the school shop and art room

Storekeeper-Stockman, Arco Pub. Co., Inc., 219 Park Ave. South, New York, NY 10003 ($4)
Making Useful Things of Wood, Publishers Central Bureau, 33-20, Hunters Pount Ave., Long Island City, NY 11101
Should You Go into Retailing? by Fred Lazarus, Jr., New York Life Insurance Co., Career Information Service, Box 51, Madison Square Station, New York, NY 10010
Stock Management in Small Stores (Bulletin #26) Small Business Administration, 811 Vermont Ave., NW, Washington, DC 20005

Write to:
National Hobby Institute, Cape Coral Gardens, Cape Coral, FL 33904
Hobby Industry Association of America, 200 Fifth Ave., New York, NY 10010

Evaluation:

Comments on use:

Subject Area(s) Math and Recreation

Unit(s) Hobby Shop Manager, p. 2

Objective(s):

Procedure:

Resources and Materials:

American Hobby Federation, 12
East 41st Street, New York,
NY 10017

Hobby Clubs of America, 410
Cathedral Parkway, New York,
NY 10025

All States Hobby Club, 101
Chestnut Hill Lane, Reistutown,
MD 21136

Films: "Along the Right of Way," Model Railroader Magazine, Film Bureau, 1027 N. 7th St., Milwaukee, WI 53233

"Report to Consumers," Modern Talking Picture Service,
2323 New Hyde Park Road, New Hyde Park, NY 11040

"Care and Handling of Buyers," 16mm, black and white, sound, 45 min. Pay return postage. Modern Talking Picture Service,
1212 Avenue of the Americas,
New York, NY 10036

"Every Minute Counts," 16mm, black and white, sound, 10 min. Pay return postage. Norwood Films, Inc., 926 New Jersey Ave., NW, Washington, DC 20001

Evaluation:

Comments on use:

Siebert McDaniel

Subject Area(s) Math and Recreation

Unit(s) Gunsmith

Objective(s): To use mathematical concepts as they relate to the career of gunsmith.

Procedure:

General math:

- Meaning and the measurement of angles
- Compute the speed of sound
- Compute the velocity of a falling object
- Compute the velocity of an object moving in a straight line
- How to figure the stress put on a material
- How to figure the density of woods
- How to determine the size of the bore of a gun
- How to figure the resistance caused by friction and heat

Related activity suggestions:

Visit a military ordnance base.

Invite a conservation agent to class.

Visit to a gunstock factory.

Invite an instructor from the trade school.

Tear down and assemble gun.

Make gun stock in school shop class.

Repair timergun for track coach.

Resources and Materials:

School textbooks in advanced math, physics and chemistry

Bulletins from the National Rifle Association

Free materials from the firearms companies

Gunsmith: Early American Occupation, Century House, Americana, Watkins Glen, NY 14891 ($1.25)

Home Gunsmithing Digest, Follet Pub. Co., 20 North Wells St., Chicago, IL 60606 ($4.95)

Write to: Colt's Firearms Division, Colt Industries, P.O. Drawer 1740, Hartford, CT 06102

Remington Arms Co., Inc., 939 Barnum Ave., Bridgeport, CT 06602

Films: "ABC of Hand Tools," 16mm, color, sound, 33 min. Pay return postage. General Motors Corp., General Motors Bldg., Detroit, MI 48202

"Teaching Gun Safety in the Public Schools," 16mm, black & white, sound, 12 min. Pay return postage. Daisy Heddon, Training Service, Rogers, AR 72756

Evaluation:

Comments on use:

Siebert McDaniel

Subject Area(s) Mathematics

Unit(s) Public Service Occupations - Postmaster

Objective(s):
Students will become familiar with the work and working conditions of a postmaster. Students should see the importance of mathematics in this field. Students can figure at a quicker pace when necessary (i.e. selling stamps). The student will be able to figure salaries. Student will know how to charge postage on packages. Making correct change and counting it will become "automatic."

Procedure:	Resources and Materials:
The following activities will be directed by the teacher in relation to a career as a postmaster: Prepare a written report about the postmaster and the work of a postmaster.	Occupational Outlook Handbook Bulletin 1700, U.S. Dept. of Labor, p. 846. Popeye and Public Service Careers, King Features Syndicate, New York, NY 1973. OVIS Guide to Career Exploration, D'Costa, Winefordner, Odgers, and Koons, Harcourt Brace Jovanovich, Inc., New York, NY 1972, pp. 13-14. Contact the local U.S. post office.
Have the local postmaster speak to the class about his career and how mathematics is involved.	Local postmaster
Take a field trip to the local post office to observe the duties of the postmaster as he performs them.	Local post office
Learn multiplication tables to twenty.	Teacher handouts
Learn to read tables for conversion.	Conversion table from local post office
Work with figuring salaries and withholding taxes.	Mathematics for Daily Living, Lewis, Harry, McCormick-Mathers Pub. Co., Inc., Cincinnati, OH

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Public Service Occupations - Postmaster, p. 2

Objective(s):

Procedure:

Master the art of making and counting change.

Set up a post office with a postmaster and let students mail items.

Postal Clerk

Resources and Materials:
1970, pp. 108-110, 144-153, and 161-179.

Scale

Write for:
Post Office (Bulletin 1450-110)
Superintendent of Documents,
U.S. Government Printing Office,
Washington, DC 20402 (10¢ per copy)

Films:
"If the Mail Stopped," 16mm, color, sound, 27 ½ min or 16mm, color, sound, 12 ½ min. Pay return postage.
"Straight Line--The Story of the Zip Code," 16mm, color, sound, 25 min. Pay return postage.
"Zip Code With the Swinging Six," 16mm, color, sound, 15 min. Available from post office.

Evaluation:

Comments on use:

William Smart

Subject Area(s) Mathematics

Unit(s) Public Service Occupations - City Manager

Objective(s):

The duties of a city manager will be exposed to the students by observation. The student will see the importance of mathematics in this occupation. Students will learn to interpret figures graphically as well as working with statistics. To study statistics and project figures. Students learn to work with a budget, see the cost of running their city and learn to figure and multiply percentages.

Procedure:	Resources and Materials:
The following activities will be directed by the teacher in relation to a career as a city manager:	
Prepare a written report about the duties of a city manager.	Occupational Outlook Handbook, Bulletin 1700, U.S. Dept. of Labor, p. 277. Popeye and Public Service Careers, King Features Syndicate, New York, NY, 1972. International City Management Association, 1140 Connecticut Avenue, Washington, DC 20036
If your city or a nearby city has a city manager, invite him to speak to the class about his duties and how mathematics is involved.	Local city manager
Provide an opportunity for the students to visit the office of a city manager and observe his duties.	Office of a city manager
Graph the population of the U.S. for the last five census periods.	The World Almanac, New York World--Telegram, New York, NY Mathematics for Daily Living, Lewis, Harry, McCormick-Mathers Pub. Co., Inc., Cincinnati, OH, 1970, pp. 144-181, pp. 507-513, 583-592.

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Public Service Occupations -
City Manager, p. 2

Objective(s):

Procedure:

Project the population of five of the twenty largest cities for 1980, using the 1960 and 1970 census as a guide.

Secure a budget of a large city and figure the percentage spent on each major area.

Imagine each student is the city manager of your town. Knowing the funds available, set up a budget using the percentages from the activity above.

Resources and Materials:

Copy of large city budget

Teacher handouts

Evaluation:

Comments on use:

William Smart

Subject Area(s) Mathematics

Unit(s) Public Service Occupations - Highway Patrol

Objective(s):

Through this activity the student will become more aware of the duties and responsibility of the highway patrol and how mathematics relates to the career. Student will be able to comprehend more easily why accidents occur. To be able to interpret numbers graphically. Students should gain a better understanding of the need for speed limits in certain areas. Students learn to reason as well as use fundamental process while

Procedure:	Resources and Materials:
The following activities will be directed by the teacher in relation to a career as a highway patrolman:	
Prepare a written report about the duties of a highway patrolman.	Occupational Outlook Handbook, Bulletin 1700, U.S. Dept. of Labor, p. 349. Popeye and Public Service Careers, King Features Syndicate, New York, NY 1972 Is My Job for You?, Dic Gardner, The John Day Co., New York, NY, 1962, pp. 35-42. Missouri State Highway Patrol, Jefferson City, MO 65101
Invite the trooper in your area to come and speak to the class about his career and how mathematics is used.	Local state trooper
Calculate the braking distance for speeds from 20 mph to 55 mph using the formula: BRAKING DISTANCE = $(1/10 \times \text{speed})^2 \times 5$.	Teacher handouts Mathematics for Daily Living, Lewis, Harry, McCormick-Mathers Pub. Co., Inc. Cincinnati, OH, 1970, pp. 35-41, pp. 513-537.
Construct a graph from the figures found when calculating braking distance.	

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Public Service Occupations - Highway Patrol, p. 2

Objective(s):
making a table much like one used by aerial patrol. The student can see the importance of conversion tables to the highway patrol.

Procedure:	Resources and Materials:
After discussing reaction time and its effect on total stopping distance, graph the total stopping distance in a different color on the graph developed.	
Construct a graph of the number of accidents in the county for the last twelve months.	
Work problems figuring the speed of a car if it takes x seconds to cover 100 miles. (x should range from 1.0 to 7.0 on even tenths.)	
Use the figures found to do some role playing as arresting officers in a speeding offense.	The county sheriff's office

Evaluation:

Comments on use:

William Smart

Subject Area(s) Mathematics

Unit(s) Public Service Occupations - School Teacher

Objective(s):

The student will become more familiar with the profession of teaching. Students will learn to average grades. Students will learn central tendency measures and figure percentages. The student will learn to work with money and the importance of keeping accurate records.

Procedure:

The following activities will be directed by the teacher in relation to a career as a school teacher:

Prepare a written report about the occupation of a school teacher.

Invite teachers from elementary, secondary and college to speak before the class about their profession and the importance of mathematics.

Work with averaging of numbers.

Resources and Materials:

Occupational Outlook Handbook, Bulletin 1700, U.S. Dept. of Labor, pp. 211-219.

Popeye and Public Service Careers, King Features Syndicate, New York, NY, 1972.

Write to: U.S. Department of Health, Education, and Welfare, Office of Education, Washington, DC 20202

American Federation of Teachers, 1012 14th St., NW, Washington, DC 20005

National Commission on Teacher Education and Professional Standards, National Education Association, 1201 16th St., NW Washington, DC 20036

Local teachers

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Public Service Occupations - School Teacher, p. 2

Objective(s):

Procedure:	Resources and Materials:
Study the difference between the mean, the median, and the mode.	Mathematics for Daily Living, Lewis, Harry, McCormick-Mathers Pub. Co., Inc., Cincinnati, OH, 1970, pp. 507-512, pp. 583-592.
Learn the proper way to figure percentages.	
Expose students to the counting and adding of money.	Teacher handouts
Elementary School Teacher	Write for: List of Nat. Ed. Assoc. Publications, Publications Director, Research Division, National Ed. Assoc. 1201 16th St., Northwest Washington, DC 20013 (free) Teaching as a Career, Order No. FS5.226:26014 Supt. of Documents, U.S. Government Printing Office, Washington, DC 20402 (20¢) Films: "Freedom's Future" 16mm, color, sound, 25 min. Pay return postage. Book 4 weeks ahead. The Milwaukee Journal, Public Service Bureau, Milwaukee, WI 53202

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Public Service Occupations -
School Teacher, p.3

Objective(s):

Procedure:

High School Teacher

Resources and Materials:

"Let Them Learn" 16mm, color, sound, 27 min. Pays transportation charges. Four weeks advance booking. Encyclopaedia Britannica Educational Corporation, Public Relations Department, 425 N. Michigan Avenue, Chicago, IL 60611

Write to: National Citizens Council for Better Schools, 9 East 40th St., New York, NY 10016 (free)

American Federation of Teachers, 716 N. Rush Street, Chicago, IL 60611

Invitation to Teaching, National Education Association, 1201 16th St., NW, Washingotn, DC 20036 (25¢)

Evaluation:

Comments on use:

William Smart

Subject Area(s) Mathematics

Unit(s) Public Service Occupations - Landscape Architect

Objective(s):

The student will be aware of the occupation, what is required, and the importance of mathematics. The student will demonstrate proper use of the slide rule. Students will be familiar with volume computation for activities such as filling holes. Geometric constructions should be understood and drawings of landscape should be easier to make.

Procedure:	Resources and Materials:
The following activities will be directed by the teacher in relation to a career in landscape architecture:	
Prepare a written report on the duties of a landscape architect.	*Occupational Outlook Handbook*, Bulletin 1700, U.S. Dept. of Labor, p. 244 Write to: American Society of Landscape Architects, Inc., 2013 I Street NW, Washington, DC 20006 U.S. Department of Agriculture, Forest Service, Washington, DC 20250
Invite a landscape architect to visit the class and explain the importance of mathematics in their career.	Landscape architects may be found in the yellow pages of large city phone books.
Teach students how to use a slide rule.	Slide rule, teacher handouts
Explore ways to figure volume of different three dimensional figures.	Formulas for volumes
Study a unit on geometrical drawings and construction.	Any geometry book
As a final project, construct a hypothetical situation in which the student must make a drawing and compute the cost of landscaping a site. Examples of needs and cost could be: 300 yards of dirt $8/yard	Local business for current prices Construction utensils

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Public Service Occupations -
Landscape Architect, p. 2

Objective(s):

Procedure:

35 trees	$7/tree
150 shrubs	$3/shrub
700 yards of sod	$1.50/yard
75 yards of concrete	$6/yard

Resources and Materials:

Evaluation:

Comments on use:

William Smart

Subject Area(s) Mathematics

Unit(s) Marine Science Occupations - Deep Sea Diver

Objective(s):

To allow students a chance to explore items dealing with deep sea diving and to talk with some in the field. Students will be exposed to the cost of starting into this career. Students will learn to describe shapes to those who cannot see them.

Procedure:	Resources and Materials:
The following activities will be directed by the teacher in reference to a career as a deep sea diver: Write a report about one article dealing with diving.	Magazine articles: "Scuba Diver Discovers Bonanza," Ebony, Jan. 1973, pp. 54-56+. "Try an Underwater Vacation," J. H. Winchester, Reader's Digest, Feb. 1973, pp. 188-189+. "And a Safety School for Divers," J. Campbell, Sports Illustrated, Jan. 29, 1973, pp. 37-41. "Learning to Survive as a Scientist-in-the-Sea," Science Digest, Oct. 1972, pp. 81-82.
	Popeye and Marine Science Careers, King Features Syndicate, New York, NY, 1973.
Invite a diver from the area to speak to the class.	Local diver
Compute the cost of the suit of a deep sea diver.	Catalogs from stores which sell equipment. A teacher handout showing what is needed for a suit.
Create role playing situations with divers and others aboard ship. Be sure divers and crew cannot look at each other and have the diver describe different geometrical shaped items he has found on the ocean floor. The crew tries to guess what he or she has found.	Teacher handout of different articles to be described on ocean floor.

Evaluation:

Comments on use:

William Smart

Subject Area(s) Mathematics

Unit(s) Marine Science Occupations - Oceanographer

Objective(s):

By writing this report, the students will become acquainted with a career in oceanography. Students should master the slide rule. Students will learn to interpret figures graphically. Students will see the difference in running directly between two points and going in an indirect manner. Students will learn to construct chart properly.

Procedure:

The following activities will be directed by the teacher in relation to a career as an oceanographer:

Prepare a written report about the oceanographer.

Proper use of the slide rule through working problems.

Prepare a chart or graph dealing with water depths and temperatures.

Prepare a drawing of two points with water between and have students figure the amount of cable needed to

Resources and Materials:

Occupational Outlook Handbook, Bulletin 1700, U.S. Dept. of Labor, p. 157

Popeye and Marine Service Careers, King Features Syndicate, New York, NY, 1973.

Write to: International Oceanographic Foundation, One Rickenbacker Causeway, Virginia Key, Miami, FL 33149

National Oceanography Assoc., 1900 L St., NW, Washington, DC 20036

National Oceanic and Atmospheric Administration, Room 218, Building 5, 6010 Executive Boulevard, Rockville, MD 20852

"Oceanography," Career World, Curriculum Innovations, Inc., May 1973.

Slide rules, teacher handouts

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Marine Science Occupations - Oceanographer, p. 2

Objective(s):

Procedure:

run:
   directly between the two
   between the two on the floor of the water between them

Make at least three charts having something to do with the oceans of the world.

Resources and Materials:

World Almanac
Reference books

Write for:
Weathermen of the Sea, U.S. Coast Guard, Public Information Division, Washington, DC 20025
A Reader's Guide to Oceanography, Woods Hole Oceanographic Institution, Woods Hole, MA (free)
A Career in Oceanography, Pamphlet No. 8, Interagency Committee on Oceanography, Room 1714, Building T-3, 17th St. and Constitution Ave., NW, Washington, DC 20360

Some excellent classic books available in libraries are:
The Silent World and The Living Sea, by Jacques Yves Cousteau
Seven Miles Down, by Jacques Piccard and Robert S. Dietz

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Marine Science Occupations - Oceanographer, p. 3

Objective(s):

Procedure:

Resources and Materials:

Films: "The Restless Sea" 16mm, color, sound, 60 min. Pay return postage. Request from Bell System Telephone Office.
"Ship Explorer Oceanographic Cruise" 16mm, black & white, sound, 27 min. Pay return postage. Book 1 month in advance. Coast and Geodetic Survey, Washington Science Center, U.S. Dept. of Commerce, 6015 Executive Boulevard, Rockville, MD 20852
"Mission: Oceanography" (MN-10145) 1966, 16mm, sound, 28 min. Department of the Navy, Ninth Naval Training Center, Building L, Great Lakes, IL 60088. Book well in advance.

Evaluation:

Comments on use:

William Smart

Subject Area(s) Mathematics

Unit(s) Marine Science Occupations - Ship Designer

Objective(s):

The students will become better acquainted with the career of ship designer. The student will gain an understanding of the problems of a designer. Students will learn the financial aspect of ship designing. The students will learn to work with area, interpret scales, and a fundamental process, multiplication. Students will be able to work with problems which require three of four steps.

Procedure:	Resources and Materials:
The following activities will be directed by the teacher in reference to a career as a ship designer:	
Prepare a written report about ship designers.	Reference books
If possible, invite a ship designer or architect in to lecture to the class.	Architect or ship designer
Divide the class into groups. Have each group purchase and construct a small plastic model ship. Then have them individually draw the ship's design.	Plastic model Construction apparatus
Figure the approximate cost of the materials to construct a ship like the model.	Current metal prices
Figure the floor area in the ship.	Formulas for area
Estimate the cost of painting the hull of the ship.	Teacher handout concerning footage covered per gallon, cost of paints, etc.

Evaluation:

Comments on use:

William Smart

Subject Area(s) Mathematics

Unit(s) Marine Science Occupations - Cartographer

Objective(s):

The student can explore the field of cartography. Students will visualize in scale how things will look from above. Also scale interpretation is involved. Students will learn to deal with perspective from a different angle.

Procedure:

The following activities will be directed by the teacher in relation to a career as a cartographer:

Prepare a written report about the work of a cartographer.

Using the drawings from activities two and three, construct a plaster model of your map.

Resources and Materials:

Occupational Outlook Handbook, Bulletin 1700, U.S. Dept. of Labor, p. 203
Popeye and Marine Service Careers, King Features Syndicate, New York, NY, 1973.
Association of American Geographers, 1710 16th St., NW, Washington, DC 20009

Plaster
Boxes
Maps
Chisels and knives

Write to
Association of American Geographers, 1146 16th St., NW, Washington, DC 20036
Free sample maps available as follows: American Forest Products Industries, Inc., 1816 N. St., NW, Washington, DC 20036
Interstate Highway Map, Portland Cement Association, 33 W. Grand Ave., Chicago, IL 60610

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Marine Science Occupations - Cartographer, p. 2

Objective(s):

Procedure:

Resources and Materials:

Films: "The Giant Step" 16mm, color, sound, 29 min. Lockheed Georgia Co., Motion Picture Film Library, Zone 30, B-2 Building, Marietta, GA 30061
"Mapping the World" 16mm, color, sound, 26 min., U.S. Army Engineer District, Savannah, 200 East Julian St., P.O. Box 889, Svannah, GA 31402

Evaluation:

Comments on use:

William Smart

Subject Area(s) Mathematics

Unit(s) Marine Science Occupations - Licensed Merchant Marine Officer

Objective(s):

Students will explore a career area. Students will learn to read maps. Plotting points will be made easier. Students will learn to figure salary from hourly wages. As there are no landmarks on the water, students will learn how to travel through the aid of a compass.

Procedure:

The following activities will be directed by the teacher in relation to a career as a licensed merchant marine officer:

Prepare a written report about the duties of a licensed merchant marine officer.

Work with map reading, as it is important here.

Work with plotting points on graph paper. This would have to do with plotting location of the ship.

Since the head of the ship is often the paymaster, the computation of salaries should be studied.

Spend a few days working with giving directions with respect to direction and degrees.

Resources and Materials:

Occupational Outlook Handbook, Bulletin 1700, U.S. Dept. of Labor, p. 743.

Write to: Officer of Maritime Manpower, Maritime Administration, U.S. Dept. of Commerce, Washington, DC 20235

International Organization of Masters, Mates and Pilots, 39 Broadway, New York, NY 10006

National Marine Engineers, Beneficial Association, 17 Battery Place, New York, NY 10004

Mathematics for Daily Living, Lewis, Harry, McCormick-Mathers Pub. Co., Inc., Cincinnati, OH, 1970, pp. 29-34, pp. 143-153.

Graph paper, teacher handouts

Evaluation:

Comments on use:

William Smart

Subject Area(s) Mathematics

Unit(s) Health Occupations - Dietitians

Objective(s):

The student will explore the work of a dietitian and the relation of mathematics to this career. The student may use any type of graph to express the numbers they find which will help in the understanding of graphs. The student will be able to look at the computations and see if it is logically possible to figure gaining and losing weight. The student will learn some economics as well as a lesson in addition and subtraction.

Procedure:	Resources and Materials:
The following activities will be directed by the teacher in relation to a career as a dietitian:	
Prepare a written report on dietitians.	Occupational Outlook Handbook, Bulletin 1700, U.S. Dept. of Labor, p. 129 Popeye the Sailor and Health Careers, King Features Syndicate, New York, NY, 1972 Write to: American Dietetic Assoc., 620 N. Michigan Ave., Chicago, IL 60611 U.S. Civil Service Commission, Washington, DC 20415 Reference books
Invite a dietitian to speak to the class about how mathematics is involved in the career.	Local dietitian
Take a field trip to a local hospital to observe the work of the dietitian.	Local hospital
Prepare a graph on the number of calories needed by the average person (male and/or female) from age 10 to 30.	Any book from home ec. dept. which lists needed calories Mathematics for Daily Living, Lewis, Harry, McCormick-Mathers Pub. Co., Inc., Cincinnati, OH, 1970, pp. 108-111.
Compute the number of calories they need to add (deduct) in order to gain (lose) x number of pounds in 30 days.	Local physician or school nurse Any books which discuss calorie intake. Teacher handouts

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Health Occupations - Dietitians
p. 2

Objective(s):

Students will learn division.

Procedure:

Take a field trip to a local grocery store and compare the cost of items. Compute a grocery list and see how much money they can save by buying different brand names.

Compute the cost of feeding themselves and/or their family for one week.

Plan the menu for one month for the family and project the cost.

Resources and Materials:

List of items used at home during the week. Grocery bills.

Parents' help in planning.

Evaluation:

Comments on use:

William Smart

Subject Area(s) Mathematics

Unit(s) Health Occupations - Pharmacist

Objective(s):

The student will become better acquainted with the work of a pharmacist and how mathematics is involved in his occupation.

Procedure:	Resources and Materials:
The following activities will be directed by the teacher in relation to a career as a pharmacist:	
Prepare a written report about pharmaceutical careers.	Occupational Outlook Handbook, Bulletin 1700, U.S. Dept. of Labor, p. 107 Career World, April 1973 Popeye the Sailor and Health Careers, King Features Syndicate, New York, NY 1972
Invite a local pharmacist to speak to the class about his career and how mathematics is involved.	Local pharmacist
A field trip to a local pharmacy.	Local pharmacy
Weigh small amounts of powder, sand, water, etc., and pretend to mix different types of drugs.	Scales Different colors of powder, sand, water, etc.
Figure the cost of a compound made by mixing two or more items together which are in large quantities.	Teacher handouts on how to mix certain drugs
Count change to customers who have made a purchase through problems or a hypothetical situation.	Money Mathematics for Daily Living, Lewis, Harry, McCormick-Mathers Pub. Co., Inc., Cincinnati, OH 1970, pp. 108-111.
	Write to: American Pharmaceutical Assoc., 2215 Constitution Ave., Washington, DC 20037

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Health Occupations - Pharmacist
p. 2

Objective(s):

Procedure:

Resources and Materials:
American Assoc. of Colleges of Pharmacy, 8121 Georgia Ave., Silver Springs, MD 20190
National Assoc. of Retail Druggist, 529 14th St., NW, Washington, DC 20004
National Assoc. of Board of Pharmacy, 77 W. Washington St., Chicago, IL 60602
Dean, School of Pharmacy, University of Missouri-Kansas City, 5005 Rockhill Road, Kansas City, MO 64110

Films: "This is Pharmacy" 16mm, color, sound, 27 min. Pay return postage. Sterling Movies, 43 W. 61st St., New York, NY 10023
"Day of Judgment" 16mm, color, sound, 24 min. Pay return postage. 2 months advance booking. Eli Lilly and Co., Audiovisual Film Library, P.O. Box 618, Indianapolis, IN 46206
"Friend of the Family" 16mm, sound, 6 min. Pay return postage. Book 8 weeks in advance. Return 2 days after receipt. Eli Lilly and Company, Miss A. I. Proctor

Evaluation:

Comments on use:

William Smart

Subject Area(s) Mathematics

Unit(s) Health Occupations - Physicians

Objective(s):

To explore the career of a physician. To become better acquainted with mathematics as it relates to a physician. To interpret data through the use of a graph. To understand blood pressure. To understand proportions.

Procedure:	Resources and Materials:
The following activities will be directed by the teacher in relation to a career as a physician:	
Prepare a written report about a career as a physician.	Occupational Outlook Handbook, Bulletin 1700, U.S. Dept. of Labor Occupations and Careers, Walter J. Greenleaf, pp. 174-176 Your Career in Medicine, Alan R. Bleich So You Want to Be a Doctor, Alan E. Nourse Is My Job for You, Dic Gardner, pp. 81-89 Popeye the Sailor and Health Careers, King Features Syndicate, New York, NY, 1972
Invite a physician to share with the class on how mathematics relates to his occupation.	Local physician
Make a graph showing the five leading causes of death in the U.S. last year.	The World Almanac
Take the blood pressure of class members and see if the diastolic pressure is 2/3 of the systolic pressure. (Bottom 2/3 of top)	Instrument for taking blood pressure
Work with proportions.	Teacher handouts

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Health Occupations - Physicians
p. 2

Objective(s):

Procedure:

Resources and Materials:

Write to: Council on Medical Education, American Medical Association, 535 N. Dearborn St., Chicago, IL 60610

Films: "I Am a Doctor" 16mm, black & white, sound, 30 min. Pay return postage. Sterling Movies, 43 W. 61st St., New York, NY 10023
"Had I But World Enough--and Time" 16mm, black & white, sound, 28 min. Pay return postage. Merck Sharp & Dohme Film Library, West Point, PA 19486
"You Be the Doctor" 16mm, sound, color, 16 min., 1968.
Film (pay return postage) insurance. Book 8 weeks in advance, not below high school. American Osteopathic Assoc., Order Dept., 212 E. Ohio St., Chicago, IL 60611

Evaluation:

Comments on use:

William Smart

Subject Area(s) Mathematics

Unit(s) Health Occupations - Veterinarian

Objective(s):

Students should have a better understanding of the scope of work of a veterinarian and become acquainted with how mathematics relates to the career. The student will interpret data by using a graph and learn which animals are treated most often. Since most people will pay for services by check, the student will learn how to write a check. The student will learn how to make change correctly.

Procedure:

The following activities will be directed by the teacher in relation to a career as a veterinarian:

Prepare a written report about the work of a veterinarian.

Have a local veterinarian visit the class and discuss how mathematics is involved in his career.

Visit the office of a local veterinarian.

Make a graph showing the number of animals treated by the local veterinarian.

Work problems involving mileage cost, labor, and medicine. For example: Jack Jones was called one afternoon to the Bill Doe farm which was a 15 mile trip one way. Mr. Doe had 30 head of sick hogs which required 20 cc's of combiotic. It took Jack 1 hour 40 minutes to innoculate Mr. Doe's hogs. If costs were 20¢ a mile round trip, 10¢ per cc of combiotic, and $7.50 per hour of labor, how much did Mr. Doe owe Jack?

Learn how to write checks.

Learning to make and count change correctly.

Resources and Materials:

Occupational Outlook Handbook, Bulletin 1700, U.S. Dept. of Labor, p. 136
Job Experience Kit, Science Research Associates, Inc.
Local veterinarian
OVIS Guide to Career Exploration, Harcourt Brace Jovanovich, Inc., New York, NY 1972, pp. 55-56.
Mathematics for Daily Living, Lewis, Harry, McCormick-Mathers Pub. Co., Inc., Cincinnati, OH, 1970, pp. 108-111, pp. 264-278, pp. 513-537
Teacher handouts

Visual: "The Veterinarian" 16mm, color, sound, 26 min. Pay return postage, book several months in advance. Texaco, Inc., Sales Promotion Manager, 332 S. Michigan Ave., Chicago, IL 60604
Write to: American Veterinary Medical Assoc., 600 S. Michigan Ave., Chicago, IL 60605

Evaluation:

Comments on use:

William Smart

Subject Area(s) Mathematics

Unit(s) Health Occupations - Hospital Administrator

Objective(s):

Students will become aware of the scope of work done by hospital administrators and the importance of mathematics in this field. Students will learn to figure wages and withholding. Students will become familiar with a budget and the work involved. This will also help with multiplication and addition. Student will develop a better understanding of scale drawings and some of the problems encountered by a hospital administrator.

Procedure:

The following activities will be directed by the teacher in relation to a career in hospital administration:

Prepare a written report about the work of a hospital administrator.

Invite a local hospital administrator in to speak to the class about how important mathematics is to his work.

Take a field trip to a local hospital to observe the hospital administrator and his job.

Set up the following hypothetical situation:

- Staff of 10 doctors
- Staff of 18 registered nurses
- Staff of 132 licensed practical nurses
- Staff of 4 custodians
- Staff of 12 cooks and 1 dietitian

Each of these people work 40 hours per week regular time and additional hours per week overtime (figured time and a half). Figure their salary and withholding for one month on the following pay scale.

Registered nurses	48 hours	$3.50/hour
Licensed practical nurses	48 hours	$2.50/hour
Custodians	48 hours	$1.95/hour
Cooks	56 hours	$1.95/hour

Resources and Materials:

Occupational Outlook Handbook, Bulletin 1700, U.S. Dept. of Labor, p. 131

Career World, April 1973

Popeye the Sailor and Health Careers, King Features Syndicated, New York, NY 1972

Local hospital administrator

Local hospital

Teacher handouts

Mathematics for Daily Living, Lewis, Harry, McCormick-Mathers Pub. Co., Inc., Cincinnati, OH 1970, pp. 144-181

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Health Occupations - Hospital Administrator, p. 2

Objective(s):

Procedure:

Dietitian	40 hours	$2.00/hour

Borrow a copy of a budget prepared by the local hospital administrator and estimate a new budget with an 11 percent increase for the coming year.

Make a scale drawing of one floor of a new addition to a hospital with ten rooms.

Resources and Materials:

Budget of local hospital

Handout on scale drawing and possibly a sample drawing.

Write to: Division of Health Manpower, Education Services, Bureau of Health Manpower, 800 N. Quincy St., Arlington, VA 22203
American College of Hospital Administration, 840 N. Lake Shore Drive, Chicago, IL 60611
Assoc. of University Programs in Hospital Administration, One Dupont Circle NW, Washington, DC 20036
Bureau of Health Professions, Education and Manpower Training, National Institutes of Health, Bethesda, MD 20014

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Health Occupations -
Hospital Administrator, p. 3

Objective(s):

Procedure:

Resources and Materials:
Films: "Health--You and Your Helpers" 16mm, color, sound, 11 min. For rental information, write to: Charles Cahill & Associates, Inc., 5746 Sunset Boulevard, Los Angeles, CA 90028
"A Place to Get Well" 16mm, color, sound, 20 min. Pay return postage. One month advance booking. Merck, Sharp, Dohme Film Library, West Point, PA 19486
"Position of Trust" 16mm, color, sound, 25 min. Pay return postage, book one month in advance. Merck, Sharp & Dohme Film Library

Evaluation:

Comments on use:

William Smart

Subject Area(s) Mathematics

Unit(s) Manufacturing - Factory Worker

Objective(s): To find the percent of a number. To become aware of interdependence of segments of the nation's economy. To figure hours worked, wages, and overtime. To figure salary based on units of production. To be aware that tardiness can result in loss of pay. To divide and multiply by a decimal, to add decimals. To subtract denominate numbers. To relate wages to standard of living. To gather, organize data and to present as a graph. To look at career opportunities in manufacturing in own town. To assess mathematical knowledge in regard to that needed by factory workers.

Procedure:	Resources and Materials:
The teacher will discuss the importance of mathematics to the factory worker and direct the student in related activities from the following list:	
Due to the sales slump during the oil crisis of the early part of 1974, over 1,000,000 auto workers were laid off. Fifteen percent of the work force of the Big Three (General Motors, Ford, Chrysler) of 700,000 have been laid off. How many factory workers have been laid off by these three automobile makers?	The Sedalia Democrat, Sunday, April 28, 1975, p. 12C
You are the foreman in a very small factory. You have a rush order and have been authorized to spend $125 for overtime pay. Your factory pays time-and-a-half for overtime. If your factory regularly pays $2.76 an hour, how many hours of overtime work can you pay for out of the $125?	Mathematics for Daily Living by Lewis, McCormack Mathers Pub. Co., Inc., Cincinnati, OH 45202, pp. 144-157, 175
Prepare "time cards" with "clock-in" and "clock-out" times and ask students to figure hours worked.	Teacher prepared handout
Prepare problems concerning pay deductions for late arrival at work.	
A New York business research group says that even though your standard of living may have remained the same over the last 25 years, you have to earn more than twice as much in 1974 to maintain that	The Sedalia Capital, Thursday, May 2, 1974, p. 8E

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Manufacturing - Factory Worker, p. 2

Objective(s): To learn the difference between salary and take-home pay. To understand formulas. To make a frequency distribution. To determine percent of increase. To add fractions.

Procedure:	Resources and Materials:
standard. A family of 4 must earn approximately \$11,000 to purchase what \$5,000 would have bought in 1949. a. How many dollars more are needed by this family in 1974 than in 1949? b. What is the percent of increase? c. If a family of 4 lived on \$10,000 in 1949, how many dollars would they need to maintain their standard of living in 1974 at this same percent of increase?	
Appoint committees to survey factories in the town for beginning salaries, regular pay increases, and chances for advancement.	Local factories and factory employees
Make payroll sheets where the worker is paid an hourly wage. Include some overtime at time-and-a-half.	
Make payroll sheet where workers are paid "by the piece."	
Have a committee determine: a. When unemployment insurance laws were enacted in your state. b. What percent of the worker's salary goes into the unemployment fund? c. Can the worker decide whether or not he wants to contribute a part of his salary?	Missouri Employment Agency

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Manufacturing - Factory Worker, p. 3

Objective(s):

Procedure:

   d. Does the employer contribute to this fund?
   e. What is the maximum number of weeks that a worke[illegible] draw unemployment benefits?
   f. Is there a maximum for weekly unemployment benefits? Yearly maximum? If so, what are these maximums?

Make a graph showing starting salaries for as many jobs in your community as you can for a young person just out of high school. Be sure to include assembly line factory workers.

Ask factory workers in your town what mathematics they use in their work. Compare this list with the mathematics you have learned in school. Ask the factory workers which mathematical topics have helped them most and which topics they wish they could have studied.

On May 1, 1974, a new minimum wage law went into effect. It will cause minimum wages to go up in steps over the next two years to an ultimate floor of $2.30 an hour for 56 million workers. If your factory job in 1976 pays this minimum wage, how much will you earn in a 40-hour week? In a 4-week month? In the 52 weeks of a year?

Resources and Materials:

The Sedalia Capital, Wednesday, May 1, 1974, p. 4

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Manufacturing - Factory Worker, p. 4

Objective(s):

Procedure:

If a strip of 3 feet 5 inch paper of the desired width is needed to make a paper bag to bag groceries, how many bags can you make from a roll of paper of the desired width that is 150 yards long? How many inches would be left over? If your factory was making these paper bags, would you waste this much from every 150 foot roll of paper? Why?

You work in a factory that allows its employees a 25 percent discount on items manufactured in the factory. You were allowed an $8.75 discount on a clock made in the factory. What was the regular price of the clock?

You work at a factory that allows its employees a 15 percent discount on articles manufactured by the company. How much will you save by buying a $23.60 blender from the company?

Eighteen percent of your last week's salary at the Acme Small Tool Factory was withheld for income tax. If $27.40 was withheld, what was your salary? If no other deductions were made, what was your take-home pay?

Because of a low salary, only 7 percent of your salary was withheld. If your salary was $60, how

Resources and Materials:

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Manufacturing - Factory Worker, p. 5

Objective(s):

Procedure:	Resources and Materials:
much income tax was withheld?	
Ask each student in class to ask 5 persons who work in manufacturing plants for 3 mathematical formulas that they use in the plant. Then ask the student to write a paragraph explaining what each formula means and a paragraph giving examples of the use of each formula.	
Choose committees to visit the person in charge of hiring personnel in factories. Ask this person what specific knowledges and skills are considered most important in hiring personnel. Ask him to include math skills and knowledge. Make a frequency distribution showing the joint findings of the committee.	
Ask students to go to the high school counselor and ask him how many seniors who did not go to college that he helped find jobs for each year for the last 5 years. Ask him how many of these jobs were with a manufacturing company. Prepare a graph showing both sets of data.	High school counselor
Sometimes when a manufacturing company comes to a town to start a factory, bonds are voted by the citizens of the community to get the money that the factory needs. The people of the community are often told that voting for the bonds will "cost them	Industrial developer

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Manufacturing - Factory Worker, p. 6

Objective(s):

Procedure:

nothing." Ask the industrial developer to come to the classroom and explain this situation.

You worked 52 hours at Factory A and received $98.80. You then got a job in Factory B and received the same amount of money for working 40 hours. How much is this an hour at each factory? What is the rate of increase per hour?

Jack Allen's time card showed that he had worked 8 5/6 hours, 9 3/4 hours, 7 1/2 hours, and 10 1/4 hours last week.

a. What was the total number of hours that Jack worked last week?
b. If all time over 8 hours daily was overtime, how much overtime had Jack?
c. If Jack's pay for regular hours is $2.20, how much did you earn during regular hours?
d. If he receives time-and-a-half for overtime, how much did he receive for his overtime hours?
e. What was Jack's total earning last week?

Resources and Materials:

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Manufacturing - Factory Worker,
p. 7

Objective(s):

Procedure:

Simulated Factory Assembly Line Project

Divide the class into "factories."

Each "factory" has an order for a set (number in set to be determined by teacher or by "factory") of learning cubes.

Each cube is made from 2 clean, empty 1/2 pint (or other size) milk cartons.

After the cartons have been properly cut as described below, the open end of one is pushed inside the open end of the second making a cube.

Station one worker(s), using whatever measuring and marking tools necessary, make a line on each side of each milk carton so that the height of each side up to the line is equal to the length and to the width of the base (bottom). When the carton is marked, it is passed to station two.

Station two worker(s) carefully cut on the marked line. The portion cut from the top of the carton is discarded, and the bottom part is passed to the next station.

Station three worker(s) take 2 cartons that come from station two and passes one carton as it is to next station; cuts from the top of carton 1/4" slits down

Resources and Materials:

Supply of empty milk cartons--rulers, scissors, clear marbles or styrofoam balls, paint or magic markers, contact paper

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Manufacturing - Factory Worker, p. 8

Objective(s):

Procedure:

each side seam of second carton; passes second carton to the next station.

Station four worker(s) take one carton with cut seams and one without seams slit.

The carton without cut seams is pushed--top of carton first--inside the carton with the slit edges.
Top of carton pushed inside may be pressed toward center of carton so that it will slide easily inside second carton.
Workers measure length, width, and height of cube to see that measurements are equal plus or minus 1/4".
If measurements are not within 1/4", workers make necessary adjustments.
Pass cube to next station.

Station five is the inspection station.

Inspector measures cube edges.
If height is equal (+ 1/4") to edge of base, inspector passes cube to next station.
If cube's measurements don't "pass inspection," cube is returned to station 4 for corrections.
When satisfactory corrections are made by station four, inspector passes cube to next station.

Station six workers cover cube with contact paper of light color. Cover is to fit nicely and all cube is to be covered. Cover of contact paper doesn't have

Resources and Materials:

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Manufacturing - Factory Worker, p. 9

Objective(s):

Procedure:

to be all of one piece.

Station seven is the marking and recording station. Each of the 10 digits has been painted on a clear marble or small styrofoam ball. The marbles or balls are put in a sack so that the worker cannot see them. The worker with the sack reaches into the sack without looking in and takes out a marble and reads the number from it. Then this worker puts the marble back in the sack and mixes the marbles well before reaching in again.
Second worker with magic marker writes the number called on one side of the cube.
Third worker has a sheet of paper with the 10 digits written in a vertical column down the left side of the page. When a number is called, this worker makes a tally mark beside that number on the paper.
This process is continued until a number has been written on each of the 6 sides of the cube.
Then the cube is passed on to the next station.

Station eight packs the completed cartons in a box for delivery to kindergarten or first grade room.

The entire factory now becomes the research department.
Researchers determine total number of faces on all learning cubes made.
Student who tallied numbers called, tells researchers

Resources and Materials:

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Manufacturing - Factory Worker, p. 10

Objective(s):

Procedure:

the number of times each digit was called.

Researchers write a ratio comparing the number of times each digit was called to the total number of digits called.

Researchers change each ratio to a percent.

Researchers look at results. Was each number called about the same number of times. If not, why not?

When factory delivers learning blocks to customer (kindergarten or first grade room), teach simple number games to be played with cubes. Some examples follow. Students could devise many more.

Two or three students each toss a cube to floor. Class decides which number on upper face of cube is larger.

Two or three students each toss a cube to floor and class add numbers on upper faces.

Two or three students toss a cube to the floor and class makes largest--or smallest--number possible from digits on upper faces of cube.

Resources and Materials:

Evaluation:

Comments on use:

Jewell Fowler

Subject Area(s) Mathematics

Unit(s) Manufacturing - Product packager

Objective(s):

To gain an appreciation of geometry in the world of business. To develop concept of spatial relationship. To gain proficiency in measuring. To gain experience in arriving at conclusions.

Procedure:

The teacher will discuss the importance of mathematics to the product packager and direct the students in related activities from the following list:

Explore different shaped containers for products to determine advantages of different shaped containers--strength, cost to produce, ease in stacking or storing.

Design rectangular shaped boxes with sides of specified lengths and widths. List kinds of things that might be packed in boxes with those dimensions.

Design a container having the smallest possible amount of surface area that will hold a specified amount of dry beans.

Ask pupils to observe boxes of cereal, soap powder, and other items that are opened in their homes. See if boxes are completely filled. Why might manufacturers make boxes larger than absolutely necessary?

Resources and Materials:

The Story of Mathematics by Ruchlis, Harvey House Pub., Irvington-on-Hudson, NY, pp. 16-33

Evaluation:

Comments on use:

Jewell Fowler

Subject Area(s) Mathematics

Unit(s) Manufacturing - Machinist

Objective(s):

To know how a micrometer caliper works. To be able to measure correct to the nearest hundredth of an inch. To be able to add fractions. To be able to work with denominate numbers. To be able to add millimeters. To be able to divide by a fraction. To be able to change a percent to a decimal and multiply. To be able to write a ratio. To be able to divide by 100. To be able to make decisions. To be able to find averages. The student will be able to divide fractions.

Procedure:	Resources and Materials:
The teacher will discuss the importance of mathematics to the machinist and direct the students in related activities from the following list:	
Measurements in a machine shop are usually expressed as decimals rather than as fractions. What are the decimal equivalents for the following measurements? 1/8"______ 3/4"______ 15/16"______ 15/32"______	Problem Solving Mathematics, Holt, Rinehart, and Winston, NY, 1967, pp. 321-325.
Make a chart or a bulletin board showing an enlarged section of ruler with the fractional and decimal names for the parts of an inch.	Table showing fraction and decimal equivalents.
You are using a feeler gauge with 9 leaves having the following thicknesses: .001", .002", .003", .005", .010", .020", .030", .050", .100". Which combination of leaves would you use to measure an opening of .029"?	Feeler gauge
You are using the feeler gauge described in the problem above. You have used the .002", .005", .020", .050", and the .100" leaves to measure an opening. What is the size of the opening?	
Invite a machinist to the classroom to explain how he measures with a micrometer caliper.	Local machinist
Measures various pieces of sheet metal with the micrometer caliper and record the thickness of the metal in a decimal to the nearest hundredth.	Micrometer calipers and pieces of metal.

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Manufacturing - Machinist, p. 2

Objective(s):

The students will be able to subtract decimals.

Procedure:

You need to select a steel rod to cut into 15 pieces each 3 1/4" long for bolts. You must allow 3/8" for each saw cut. How long must the steel rod be to cut the 15 pieces?

Your machine shop received a shipment of 70 lbs. of 3/8" bolts. How many bolts were in the shipment if each bolt weighs 10 oz.?

A 1 meter copper bar is divided into 10 equal pieces. If you allow 2 millimeters for each saw cut, what is the total waste from saw cuts? How long will each piece of cooper be?

In your machine shop there is a stack of 36 sheets of copper. The pile is 9 inches thick. How thick is each sheet of copper?

You are an apprentice in a machine shop. You receive 65% of a machinist's pay. If a machinist receives $6.75 an hour, what will you receive?

Steel, copper, and stainless steel can be worked into a lathe at various cutting speeds of feet per minute. Find out what the speeds are. What is the ratio of cutting speed of stainless steel to the cutting speed of copper? What is the ratio of the cutting speed of copper to the cutting speed of stainless steel?

Resources and Materials:

Write for:

The Milling Machine and Its Attachments

Right and Wrong in Milling Practice

Kearney and Trecker Corp.,
1100 Theodore Trecker Way,
Milwaukee, WI 53214

Machine Tools Today . . . And Careers for Tomorrow

Machine Tools--America's Muscles

National Machine Tool Builder's
Assoc., 2139 Wisconsin Ave., NW,
Washington, DC 20007

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Manufacturing - Machinist, p. 3

Objective(s):

Procedure:

You work in a machine shop. You are paid $4.25 for every hundred pieces you turn out. Last week you turned out 8650 pieces. How much did you earn?

A machinist has to make 2 steel gears. One gear has a diameter of 4 1/8" and the other a diameter of 6 5/16". What are the dimensions of the smallest rectangular piece of steel that he can use if he leaves 1/4" between the gear and the edge of the piece of steel and 1/4" between the gears? Make a sketch showing the placement of the gears on the piece of steel. Include all given dimensions.

After you made a steel shaft, you measured it five times with the following measurements: 6.949", 7.011", 7.009", 6.950", and 6.948". What was the average of your measurements?

You are to cut a piece of drill rod that is 3' 9" into pins that are 1 3/4". How many pins will you be able to get if you allow 1/16" waste for each cut?

By mistake you drilled a circular hole with a diameter of 1.505". You had intended to make a circular hole with a diameter of 1.6" By how much must the diameter of the hole be increased?

Resources and Materials:

Films:
"Machining Stainless Steels" 16mm, black & white. Pay return postage. Jam Handy Organization, Film Distribution Department, 2821 E. Grand Boulevard, Detroit, MI 48211
"Friction Sawing" 16mm, color. Pay return postage. The DoAll Company, Film Librarian, 254 N. Laurel Ave., Des Plaines, IL 60016

Evaluation:

Comments on use:

Jewell Fowler

Subject Area(s) Mathematics

Unit(s) Manufacturing - Engineer

Objective(s):
To work a proportion. To write a ratio. To find the volume of a cylinder. To change cubic feet to gallons. To multiply and divide. To multiply and divide by a fraction or a decimal. To find the square of a number.

Procedure:
The teacher will discuss the importance of mathematics to the engineer and then direct the students in related activities from the list below:

The smaller of 2 meshed gears makes 275 revolutions per minute and the larger gear makes 25 revolutions per minute. What is the ratio of the speed of the smaller gear to the larger? What is the ratio of the larger gear to the smaller?

A pulley is 12 inches in diameter and a large pulley is 30 inches in diameter. How many revolutions per minute (rpm) does the larger pulley turn if the smaller one turns at 45 rpm?

FORMULA: $\frac{\text{Diameter of A}}{\text{Diameter of B}} = \frac{\text{rpm of B}}{\text{rpm of A}}$

A gear with 50 teeth turning at 600 rpm turns a smaller gear at 750 rpm. How many teeth does the smaller gear have?

FORMULA: $\frac{\text{Number of teeth in A}}{\text{Number of teeth in B}} = \frac{\text{rpm of B}}{\text{rpm of A}}$

Your engineering firm needs to know the capacity of a cylindrical tank that has a height of 42.6 feet and a radius of 11.3 feet. How many gallons will this tank hold if there are 7.5 gallons in each cubic foot?

Resources and Materials:

Mathematics for Career Education, Charles E. Merrill Pub. Co., Columbus, OH 43216, pp. 311-313.

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Manufacturing - Engineer, p. 2

Objective(s):

Procedure:

An engine attached to a dynamometer has a speed of 1200 revolutions per minute and a load of 120 lbs. If the arm attaching the engine to the dynamometer is 3' long, find the brake horsepower (bhp).

FORMULA: $$\text{bhp} = \frac{\text{arm} \times \text{engine speed} \times \text{load}}{5252}$$

The Society of Automotive Engineers (SAE) rate horsepower by a method that uses the number of cylinders in the engine and their diameter. Find the SAE horsepower rating of an 8-cylinder engine with a bore of 3 1/2".

FORMULA: $$\text{SAE hp} = \frac{\text{Diameter squared} \times \text{number of cylinders}}{2.5}$$

The size of engine displacement contributes directly to its horsepower rating. The displacement is the difference between the number of cubic inches of air in the cylinder when the piston is at the bottom of its stroke and the amount of air in the cylinder when the piston reaches the top of its stroke. In an 8-cylinder engine the bore is 4.25", the stroke is 3.50", and the displacement is _____ cubic inches.

FORMULA: $$\text{displacement} = \pi r^2 \times \text{stroke} \times \text{no. of cylinders}$$

Resources and Materials:
Modern Applied Mathematics, Houghton Mifflin Co., NY, 1971, pp. 208-210.

Evaluation:

Comments on use:

Jewell Fowler

Subject Area(s) Mathematics

Unit(s) Manufacturing - Electrician

Objective(s):
To multiply and divide integers. To gather, organize and present data. To make an invoice.

Procedure:
The teacher will discuss the importance of mathematics to the electrician and then direct the students in related activities from the list that follows:

An electric motor that runs on a 110-volt line takes 15 amperes. What is its approximate horsepower? (One horsepower is equal to 746 watts.)

FORMULA: $$\text{hp} = \frac{\text{volts x amperes}}{746}$$

An automobile starter uses 300 amps at 8 volts. What is its horsepower?

FORMULA: $$\text{hp} = \frac{\text{volts x amperes}}{746}$$

An air conditioner draws a current of 18 amps and has a resistance of 40 ohms. Find the voltage.

FORMULA: Volts = number of amps x resistance in ohms

Make a survey of items in your home that use electricity. Make a chart showing the name of the article, the amount of electricity it uses in watts, and the use of the electrical item--to produce motion, light, heat, etc. See which kind of appliances use the most electricity and which use very little electricity.

Resources and Materials:
Modern Applied Mathematics, Houghton Mifflin Co., 1971, pp. 212-214

Items in a home

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Manufacturing - Electrician, p. 2

Objective(s):

Procedure:

Make an invoice that shows your purchases at the Wilson Electrical Shop, 311 West Avenue, for the following articles: 8 tubes number AK63 at $2.79; 24 switches number A311 at $3.34 and 12 condensers number AR404 at $3.69. Find the amount of the bill.

Resources and Materials:

Evaluation:

Comments on use:

Jewell Fowler

Subject Area(s) Mathematics

Unit(s) Transportation - Truck driver

Objective(s):

To gather, organize and interpret data. To become more aware of mathematics in the world about them and in relating to trucking. To determine distances on a map. To observe uses of geometry in the trucking industry. To multiply decimals. To compute time in different time zones. To subtract, add, and divide integers. To make decisions based on information and reasoning.

Procedure:	Resources and Materials:
The teacher will discuss the importance of mathematics to the truck driver and direct the student in related activities from the following list:	
Find the cost of licensing different sized trucks. Find the criteria for determining the cost of the license.	Local license bureau
Determine amounts paid by truck drivers engaged in Interstate Commerce pay for licenses for their trucks. Report to the class.	Interstate Commerce Commission
Observe trucks on the highway for signs on the trucks telling how many dollars of highway taxes were paid by the owner of the truck.	Trucks traveling on highway
Interview truck drivers to find out whether they own or lease the trucks they drive. Determine the approximate cost of the tractor.	Truck drivers
Interview truck drivers and ask them the approximate wage that a person hired to drive a truck is paid.	
Determine the cost of sending a pound (of a ton) of freight by air, truck, and train from Kansas City to St. Louis. Discuss factors other than cost that would help determine the method to choose to move the freight.	Railroad office, trucking companies, air freight office

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Transportation - Truck Driver, p. 2

Objective(s):

Procedure:

As you were preparing to deliver a load of new cars from Kansas City, you traced your route on a road map. Then you measured these distances and found them to be 3 7/8 in., 2 3/4 in., 3 7/16 in., 2 1/2 in. If each inch of this map represents 40 miles, how many miles are represented by the sum of these lengths? Look on a road map and find a city or town that is this approximate distance from Kansas City.

The speedometer reading on your truck was 86,432 miles when it was overhauled the first time. The speedometer reading was 145,831 when it next needed to be overhauled. How many miles was the truck driven between overhauls?

Assign groups of students to observe the shapes of beds on trucks that are on the highway. Students are to see if they can determine any relationship between the shapes of the beds and the kinds of things the truck hauls.

Have students use road maps to:

a. Find straight line distances between specified towns.

b. Then decide on the best route between the two towns.

Resources and Materials:

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Transportation - Truck Driver, p. 3

Objective(s):

Procedure:

c. Have the students use the scale of miles on the map and find the number of miles one would have to travel on this route.

d. Ask the students to find the difference between the straight line distances and the distance on the chosen route.

e. Have the students use the map legend and determine the kinds of roads on the above route.

Your truck averaged 49.8 miles an hour for 6.25 hours. How far did you travel?

Your truck left Kansas City at noon. You stopped for coffee at 4 p.m. at a cafe 212.8 miles from your starting point. How many miles per hour did your truck travel?

You started driving your truck west from somewhere in Missouri at 1 a.m. Central Time. After driving for 10 hours, you were somewhere in Colorado. What time was it in Mountain Time?

If you had driven east from your starting point in Missouri at 1 a.m. Central Time and had driven for 10 hours, you might have found yourself in West Virginia. What time would it have been there in Eastern Time?

Resources and Materials:

Write for free information:
American Trucking Association, Inc., 1616 P Street, NW,
Washington, DC 20036
International Brotherhood of Teamsters, Chauffeurs, Warehousemen, and Helpers of America, 265 West 14th Street,
New Yori, NY 10011

Films (pay return postage):
"The Strongest Link" 16mm, color, sound, 26 min. Modern Talking Pictures Service, 3 East 54th Street, New York, NY 10022
"Trucks and Your Town" 16mm, color, sound, 23 min. Sterling-Movies U.S.A., Inc. 43 West 61st

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Transportation - Truck Driver, p. 4

Objective(s):

Procedure:

Your tractor-trailer is licensed for 73,280 lbs. This includes tractor weight, trailer weight, and load weight. The tractor weighs 16,500 lbs. and the trailer weighs 5 tons. What is the greatest number of lbs. that you can haul if you carry 1000 less than your limit?

You have been hired to haul a trailer load of steel to Portland, Oregon. Why do you feel it might be necessary to find a cargo to bring back to the mid-west? Call a local truck driver and ask him this question and see whether his reply agrees with yours.

Resources and Materials:

Evaluation:

Comments on use:

Jewell Fowler

Subject Area(s) Mathematics

Unit(s) Transportation - Mechanic

Objective(s):

To read a micrometer. To collect data, to interpret the data and make decisions based on the data. To get a realistic view of job opportunities. To gain a knowledge of the metric system's measurement of length. To be able to multiply by a decimal. To change gallons to quarts. To see advantages and disadvantages of the "flat rate book." To use Vernier calipers to measure. To find volume of various solids. To find greatest possible error and the precision of measurement. To find the amount

Procedure:

The teacher will discuss the importance of mathematics to the mechanic and direct the student in related activities from the following list:

Invite a mechanic to bring micrometer(s) to the classroom and to explain how he uses them and to teach the members of the class to read the micrometer.

Assign committees to check wage scales for union and non-union mechanics and discuss reasons for persons belonging to or not belonging to a union.

Ask members of the class to watch the classified ad section of a local paper for firms wanting mechanics. Then ask the class members to call the firms and ask the starting salary.

Use metric system to measure collection of objects used by a mechanic--bolts, wrenches, inside and outside measurement of nut, etc.

It takes 1 1/4 gallons of oil to change the oil in a car that has come to your garage. How much will the oil cost at 72 cents a quart?

Invite a mechanic to the classroom to discuss the "flat rate book" plan of charging customers.

Resources and Materials:

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Transportation - Mechanic, p. 2

Objective(s):
of work needed to lift an object of specified weight. To add decimals. To multiply by a decimal. To measure to the nearest thousandth of an inch. To learn about insurance--its importance and its cost.

Procedure:	Resources and Materials:
Teach students to use Vernier calipers: a. Teacher will use demonstration model to explain its use. b. Teacher will use demonstration model to teach students how to read its scales. c. Students will use Vernier calipers to measure rectangular solids, cubes, and cylinders and list their dimensions. d. Students will then find the volume of the solids.	Mathematics for Career Education, Charles E. Merrill Pub. Co., Columbus, OH 43216, Copyright 1972, pp. 220-238
Have several students each measure a small metal rod with Vernier calipers and make a chart showing each measurement, the precision of the measurement, and the greatest possible error.	Vernier calipers and knowledge of precision and greatest possible error
Ask students to figure how much work is necessary to lift a 500 pound engine 4 feet high to put it back in the car after the repairs on the engine have been made. Work = force x distance	
Divide the class into small groups and ask each group to ask a mechanic for a list of the minimum tools he would have to have to hold his job. Ask him to give name of tool and size--2/8" open and wrench, etc. Then ask each group to find from a different source, the cost of each item on the list and the total cost of the tools. Let the class compare lists and determine which seems to be the best	Tools

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Transportation - Mechanic, p. 3

Objective(s):

Procedure:	Resources and Materials:
buy. Discuss other factors besides the price which would help determine the best buy.	
The diameter of a motor shaft bearing is .003 in. larger than the shaft of the motor. What is the diameter of the bearing if the shaft has a diameter of 2.005?	
A mechanic is paid $5.25 an hour. His helper is paid 60% as much. How much does the helper make an hour?	
Two cars come into the garage with exactly the same thing wrong. One car is under warantee and one isn't. Which car would the mechanic rather work on? Why? Ask a mechanic.	
All the mechanics who work in the garage that you do rent uniforms at $7.50 a week. How much will your uniforms cost in one year if you have a two weeks' vacation?	
Bring spark plugs and feeler gauges to class. Ask the students to use the feeler gauges to measure the gap in the spark plugs.	Spark plugs and feeler gauges
Ask the owner of a garage what kinds of insurance he carries for his business. Aabout how much does	Owner of garage

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Transportation - Mechanic, p. 4

Objective(s):

Procedure:	Resources and Materials:
it cost him in a year? Why does he carry the insurance?	
Choose a repair part for a specific automobile. Call the repair shop of the dealership of that make of car and ask the price of the part. Then call a discount automotive repair company and ask the price of the part. Which is cheaper? Discuss reasons persons might choose to buy the part from each place.	Local garages

Evaluation:

Comments on use:

Jewell Fowler

Subject Area(s) Mathematics

Unit(s) Transportation - Taxi Driver

Objective(s): To gather information. To learn about tire sizes. To learn about insurance rates. To collect data. To learn why it is necessary to have taxis and other cars insured. To make decisions based on the information they have gathered. To figure percentage. To relate mathematics to a practical situation. To find the whole when a part is given. To realize that there is a relationship between highway speed and highway deaths. To write ratios and percents. To look critically at advertising. To figure mileage.

Procedure:

The teacher will discuss the importance of mathematics to the taxi driver and direct the students in related activities from the following list:

You have bought a car to use as a taxi cab that uses 6.70-15 tires. To what does the 15 refer? the 6.70? Make a list of tires of other sizes and interpret the numbers that name these sizes.

Invite an insurance agent to the classroom and discuss insurance rates to persons below the age of 25 and to those above the age of 25, and the reason for the difference. Ask about the difference between rates for commercially used cars and those in private use.

Collect clippings from newspapers showing amounts that persons sue for as a result of accidents with cars and taxis. Whenever possible, collect the follow-up article showing the settlement of the claim.

Find as many different estimates as possible of the cost of driving a car a mile. Then find the average cost of these estimates. Compare this estimates with the local taxi fare. Discuss the difference. Remember the many stops the cab makes. Does this affect the cost of operation?

Resources and Materials:

Local tire companies

Local insurance agent

Newspapers
Books
Magazines

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Transportation - Taxi Driver, p. 2

Objective(s):

Procedure:

Look up the price of radial tires in a current magazine or newspaper. Compare their price to the price of others the same size and ply.

It is reported that radial tires save from 5% to 10% on gas over other types of tires. Your taxi used 1100 gallons of gas last year without radial tires. How many gallons of gas would you have saved if your taxi had been equipped with radials and you saved 5% of the gasoline that you used? If you had saved 10%?

The National Safety Council has reported that fewer lives have been lost in traffic accidents since the speed limit was dropped to 55 miles per hour on the nation's highways in March 1975. In March 1974, there were 32 traffic deaths. If this represents a decrease of 25% over the traffic deaths in March 1973, about how many traffic deaths were there in March 1973.

Taxi number 36 of the Quickie Taxi Co. is equipped with tires advertised as lasting 30,000 miles. These tires have been driven 10,000 miles.

a. What is the ratio of the miles used to the advertised life of the tires in miles?
b. What percent of the advertised life of the tires remain?
c. Can the Quickie Taxi Co. be sure that these

Resources and Materials:

Consumer Digest Magazine
6316 N. Lincoln Avenue
Chicago, IL 60659
May, June, 1974, pp. 23-24

The Sedalia Capital, Thursday, May 2, 1974

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Transportation - Taxi Driver, p.

Objective(s):

Procedure:

tires will last exactly 30,000 miles? Why?

Have the students figure the mileage driven in a week by giving them the speedometer reading at the beginning of the week and the end of the week.

Resources and Materials:

Evaluation:

Comments on use:

Jewell Fowler

Subject Area(s) Mathematics

Unit(s) Transportation - Filling Station Operator

Objective(s):
To find the original when the increased amount and the percent of increase is given. To find the volume of a cylinder. To change cubic feet to gallons. To find the percent of a number. To gather data. To find depreciation. To multiply by a decimal. To figure a bill. To write tenths of a cent as a part of a dollar.

Procedure:

The teacher will discuss the importance of mathematics to the filling station operator and then direct the students in related activities from the list that follows:

Your filling station sells gas at 48.9¢ a gallon. This is 30% more than you paid for a gallon of gas. How much did the gas cost you per gallon? Give your answer correct to the nearest tenth of a cent.

The underground gasoline storage tank for your station has a diameter of 28 feet and a height of 10 feet. How much gasoline will the tank hold if there are 7½ gallons of gasoline in each cubic foot?

You buy the oil that you sell in your station for 32¢. To make a reasonable profit you must make a 30% profit on the oil. What is the selling price of the oil?

Select small groups to interview various filling station operators. Ask them what expenses they have to pay regularly. Ask them how they make money to pay these expenses and make a profit besides their profit on gasoline.

Resources and Materials:

Station operators

Write to:
American Petroleum Institute,
Marketing Division, 1271 Ave.
of the Americas, New York,
NY 10020
The Gasoline Retailer, Inc.,
19 Union Square West, New
York, NY 10003

For 35¢
Starting and Managing Your Own Service Station, Small Business Administration Publications, Small Business Ad., Washington, DC 20416

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Transportation - Filling Station Operator, p. 2

Objective(s):

Procedure:

A regular customer asked you to change the oil in his car when the speedometer reading was 36,426.3 miles. The next time you changed the oil, the speedometer reading was 41,326 miles. How many miles had the car been driven between oil changes?

Three years ago you bought a wrecker for $19,500. You have decided to buy a new one. The truck company that sold you your wrecker offered you $11,000 for it on a new wrecker. How much has the wrecker depreciated? What was the average yearly depreciation?

You order from a wholesale company 80 tires that cost an average of $41.56. How much money must you have to pay for the tires?

You make the following repairs on a car: 8 spark plugs @ $3.27; condenser @ $1.25; shock absorbers $25.50; and idler arm @ $8.80. Your labor bill for the job was $42.50.

a. Find the total bill for parts and labor.
b. The labor was what percent of the total bill?

You had been selling gas at 39.9¢ before you raised the price to 42.6¢. How much more do you get per gallon? If you sold 1200 gallons of gas today, how much more would you receive from the new price than from the old price?

Resources and Materials:

Films:
"Occupation-Auto Mechanic" 16mm, color, sound, 13 min. Pay return postage. Modern Talking Picture Service,
1212 Avenue of the Americas,
New York, NY 10036
"Say It With Service" 16mm, color, sound, 15 min. Pay return postage, book well in advance. AP Parts Corp., Public Relations Manager, 1801 Spielbusch Avenue, Toledo, OH 43601

Evaluation:

Comments on use:

Jewell Fowler

Subject Area(s) Mathematics

Unit(s) Transportation - Road Builder

Objective(s):

To collect data. To find averages. To find the volume of a solid. To change cubic feet to cubic yards. To work proportions. To multiply by a decimal. To figure time-and-a-half hourly wage. To change pounds to tons. To express feet as millimeters. To change tons to hundred pounds. To add and subtract fractions. To multiply by a decimal and a fraction. To find the whole when a part is given.

Procedure:	Resources and Materials:
The teacher will discuss the importance of mathematics to the road builder and then direct the student in related activities from the list that follows:	
Visit the engineering department of the University of Missouri that studies road building problems.	Engineering School of M. U.
Collect newspaper items showing bids for building roads. Find the cost per mile for each contract. Then find the average cost per mile.	Local newspaper
Measure a pile of gravel, sand, or dirt. Find the approximate volume of the pile.	
Assign small groups to interview local companies that do road work to find starting salaries. Find the difference in union and non-union salaries.	Local companies
Your company is to make a concrete strip of road 1/2 mile long and 28 feet wide. The concrete is to be 8 inches thick. How many cubic feet of concrete will this job require? How many cubic yards? If concrete costs $11.75 a cubic yard, how much will the concrete cost for this job? If ready-mix concrete truck can haul 7 cubic yards of concrete, how many truck loads of concrete will be required?	

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Transportation - Road Builder, p. 2

Objective(s):

Procedure:

It takes your company 52 days to complete 2 1/4 miles of road. If your contract is for 12 miles of road, how long will it take to do the job if you can complete the work at the same rate?

The D-8 caterpillar that you drive uses an average of 12.3 gallons of diesel an hour. If your "cat" worked 9 hours each day for 6 days last week, how many gallons of diesel did it use?

A D8G caterpillar weighs 85,600 lbs. Express this weight in tons.

A 112F caterpillar motor grader is 24 feet long and 12 feet wide. Express these measurements in millimeters.

You buy 2 tons of grass seed to sow along the right of way of a new road. The grass seed costs $68 per hundred lbs. What is the cost of the grass seed?

There are 35,765 yards of soil in a bank that must be moved before the road can be built. If the cost of moving this soil is 33¢ a foot, how much would the cost of digging the bank be?

Resources and Materials:

Caterpillar purchasing guide

Moving the Earth, North Castle Books, Greenwich, CT, 1962, pp. 11-42

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Transportation - Road Builder, p. 3

Objective(s):

Procedure:

Your construction company has contracts to build 15 3/8 miles of roads. Strips of completed road measure 3 1/3 miles, 2 7/8 miles, and 3 1/4 miles. How many miles of road are not completed?

Your new bulldozer costs $25,000 and has an estimated life of 15 years. Its first year depreciation is 1/3 of the cost. How much will this machine depreciate during the first year?

A set of retreads for a rear dump scoop cost $1920. If this is 3/4 of the cost of a set of new tires, how many dollars would the new tires cost?

How much would 2000 gallons of diesel fuel cost if one gallon costs $.268 if bought in 500 gallon lots?

Resources and Materials:

Evaluation:

Comments on use:

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Jewell Fowler

Subject Area(s) Mathematics

Unit(s) Agri-Business & Natural Resources, Farmer

Objective(s): To gather information and present it. To find percentages. To make decisions based on facts available. To figure interest when the rate is given for a year and when the rate is given for a month. To work 2-step problems. To find averages. To measure with tape and mark off a square. To write tenths of a cent as a part of a dollar. To change gallons to pounds. To estimate 100 feet. To gain in understanding of percents by explaining them. To gather data and exhibit the information on a bar graph or a picture graph. To make a circle graph. To write a ratio.

Procedure:	Resources and Materials:
The teacher will discuss the importance of mathematics to the farmer and direct the students in related activities from the following list:	
Make a chart showing the number of pounds of feed needed to produce 1 pound of beef, 1 pound of pork, 1 pound of poultry, and 1 pound of fish.	Feed salesmen and/or farmer
Have the student figure the number of pounds each of ingredient in a ton of feed if the percent of each ingredient in a "feed recipe" is given.	
Eggs are selling for 56¢ a dozen. The farmer has a flock of 300 hens. He has kept careful records and has found that it costs him 56¢ to produce a dozen eggs. Should he stay in the egg business? Why? What should he do if the price for a dozen eggs drops to 50¢?	
You need to borrow $1000 to buy seed and fertilizer to plant this spring's crop. You can borrow the money from your bank for one year at 9% or you can "charge" the seed and fertilizer at the local grain elevator that charges 1 1/2% a month. Which of these loans is better for you? How much better?	Mathematics for Daily Living by Lewis, McCormick-Mathers, Pub., Co., Cincinnati, OH, pp. 250-255.
A dairy herd produced 23,800 pounds of milk last month. How many 8-gallon cans will it fill?	

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Agri-Business & Natural Resources,
Farmer, p. 2

Objective(s): To find the percent of decrease. To change pounds to hundredweights and vice versa.

Procedure:

A farmer delivered to a cheese factory the following amounts of milk: 680 lbs., 425 lbs., 650 lbs., 540 lbs., 676 lbs., and 908 lbs. What was the average amount delivered by the farmer?

Use a 100-foot tape and mark off a square acre on the schoolground.

Gasoline delivered to the farm is 34.9¢ a gallon. If your farm storage tanks hold 375 gallons, how much will it cost to fill the tanks if they are empty?

The price of gasoline includes a state highway tax. You can apply for a refund of this tax for gasoline used in tractors and other non-highway farm implements. If you used 3,450 gallons of gasoline on your farm last year and if the state highway gasoline tax is 7¢ a gallon, how many dollars refund can you get from the state? The price of this gasoline also includes a federal highway tax on each gallon. When you file your federal income tax, this gasoline tax can be applied on the tax that you owe. If the federal highway tax is 5¢ a gallon, how much money can be applied to your federal, income tax? If this gasoline costs you 45.9¢ a gallon, how much did the 3,450 gallons cost after the state and federal taxes have been deducted?

Resources and Materials:

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Agri-Business & Natural Resources,
Farmer, p. 3

Objective(s):

Procedure:

Mr. Wilson sold a farm for $43,000. The farm contained 105 acres. How much did he receive an acre for his farm?

A farmer will use 3 barrels of oil during his year's work. Each barrel contains 31 1/2 gallons of oil and the oil weighs 7 5/6 pounds per gallon. He can buy the oil locally at 63¢ a gallon or he can order the oil from a wholesale company for 55¢ a gallon but he will have to pay the freight on this oil.

a. How much would the 3 barrels of oil cost locally?
b. How much will the oil cost from the wholesale company?
c. How much cheaper is the oil from the wholesaler?
d. Is this difference all profit for the farmer?
e. How many pounds of freight would the farmer have to pay for?
f. What are some of the things you would have to know before you could decide whether he should buy the oil locally or from the wholesaler?

A farmer often "steps off" distances. Take 10 large steps and measure the distance with a tape measure and record the measured distance. Repeat the above steps until you have recorded five

Resources and Materials:

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Agri-Business & Natural Resources,
Farmer, p. 4

Objective(s):

Procedure:

measurements. Find the average length of your "step." Then step off enough of your steps to make a distance that you think is 100 ft. Measure the distance with a tape measure and find the difference between the "stepped off" distance and the 100 feet that was the intended distance. Do you think that your ability to "step off" distances would improve the practice? Why?

Seed corn is advertised as having 95% germination. Explain what this means.

Divide the class into small research groups. Ask each group to gather information on the yearly production of one crop of kind of livestock (for example--the number of bales of cotton, the number of bushels of corn, the number of dairy cattle, etc.) for each year of the last 10 years. Ask each group to show this production on a bar graph or a picture graph. Do these production figures indicate a trend? Based on these figures, do you think that production of the year following those graphed will increase or decrease?

You buy fertilizer that has the formula 10-12-24. This means that 10% of the fertilizer is nitrogen, 12% phosphorous and 24% is soluble potash. The rest is inactive material. How many pounds of nitrogen, phosphorus, potash, and inactive

Resources and Materials:

Encyclopedias, agriculture books, U. S. Dept. of Agriculture

Write to:
U. S. Department of Agriculture,
Washington, DC 20250
National Council of Farmers
Cooperatives, 1200 17th St.,
NW, Washington, DC 20036

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Agri-Business & Natural Resources
Farmer, p. 5

Objective(s):

Procedure:

materials do you buy when you buy a ton of fertilizer?

Divide the class into small research groups. Ask each group to determine the food values of one natural food--corn, milk, wheat, etc. Show the results of this research on a circle graph.

Assign small groups to make lists of farmers in the area and to divide these lists into 2 groups--the farm families that supplement their income with off-the-farm employment and those that live on the income from the farm. What is the ratio of farmers with off-the-farm income to the farmers who live on the farm income? What does this indicate to you?

A shipment of wheat worth $25,000 was damaged by fire. After the fire, the wheat sold for $18,500. How much did the owner lose on the wheat? What was the percent of loss?

You shipped a load of hogs weighing 6400 pounds. What was the value of these hogs if they sold for $36.74 a hundredweight?

You paid $43.55 shipping charges on a load of hogs. If the shipping charge was 65¢ per hundredweight, how many pounds of hogs did you sell?

Resources and Materials:

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Agri-Business & Natural Resources,
Farmer, p. 6

Objective(s):

Procedure:

If it takes 4000 gallons of water to produce one pound of beef, how many gallons of water were needed to produce a steer whose carcass dressed out 536 pounds?

You need to buy a new tractor that sells for $9875. The governor of your state has suggested that the sales tax be raised from 3% to 4%. How much sales tax must you pay on the tractor now? How much more would it cost if the sales tax were increased to 4%?

Resources and Materials:

Problem Solving Mathematics, Holt, Rinehart Winston, 1967, p. 331

Evaluation:

Comments on use:

Jewell Fowler

Subject Area(s) Mathematics

Unit(s) Agri-Business & Natural Resources--
Grain Elevator Operator

Objective(s): To learn that a bushel of different grains may weigh different numbers of pounds. To find a percent more than a given number. To change pounds to tons. To find the percent of a number. To determine take-home pay under specified conditions.

Procedure:

The teacher will discuss the importance of mathematics to the grain elevator operator and then direct the students in related activities from the following list:

Interview an elevator operator and ask him which grains he usually buys by the hundredweight and which he buys by the bushel. Then look up the number of pounds to the bushel of the grains that he buys by the bushel.

You have decided that the farmers who buy your products will use 15% more fertilizer this year than they did last year. If you sold 385 tons of fertilizer last year, how many tons should you order this year?

A truck load of hay weighs on the scale at your elevator. The truck and the hay together weigh 23,875 pounds. The truck weighs 8400 pounds.

a. How much does the hay weigh? How many tons is this?
b. How much is the hay worth if it sells for $35 a ton?

Due to an increase in the cost of labor, you are forced to raise the cost of your feed by 9%. Pig starter has been selling for $8.76. How much will it cost after the price increase?

Resources and Materials:

Grain elevator operator

To Market, To Market
Marketing in Our Economy
The Farmer Wants To Know
How To Market Grain

Minneapolis Grain Exchange,
Fourth Avenue South and
Fourth Street, Minneapolis,
MN 55415

Films:
"Market Place, U.S.A."
16mm, black and white, sound, 30 min. Pay return postage, book 6 weeks in advance.
Sterling-Movies U.S.A., Inc.,
43 West 61st Street, New York,

Evaluation:

Comments on use:

Subject Area(s) Mathematics

Unit(s) Agri-Business & Natural Resources--
Grain Elevator Operator, p. 2

Objective(s):

Procedure:

At your elevator you hire 3 truck drivers and 8 others who work at the elevator. You also hire someone who answers the telephone and keeps the books.

a. Interview a grain elevator operator and determine the approximate wages that would be paid.
b. Assign a number of hours that each of these persons have worked. Begin a payroll sheet showing the persons' names and wages.
c. Look in a table that shows F.I.C.A. (Social Security) amounts to be withheld for various wages. Determine the amount to be withheld from the wages of the workers mentioned above. Assume that none of these workers have earned $7800 this year. Put these amounts in the payroll sheet you have started.
d. Assign a number of dependents to each worker. Then look in an income tax table and determine the amount of federal income tax to be withheld from each worker's income. Enter this amount on your payroll sheet.
e. Assume that there are no other deductions. Finish your payroll sheet by figuring each worker's take-home pay.
f. Write out a check to pay each worker.

Resources and Materials:

NY 10023
"Wheat Farmer" 16mm, black and white, sound, 10 min. Soil Conservation Service, Movie Film Library, 507 Federal Building, 701 Northwest Glisan, Portland, OR 97209

Social Security Office

Local Internal Revenue Office

Teacher prepared material or checks from local bank

Evaluation:

Comments on use:

Jewell Fowler

Subject Area(s) Mathematics

Unit(s) Agri-Business & Natural Resources-
Feed Salesman

Objective(s):

To collect data. To find the percent of a number. To write hundredth of a percent as a decimal. To appreciate the usefulness of math to the feed salesman. To make value judgments. To find the whole when a part is given.

Procedure:	Resources and Materials:
The teacher will discuss the importance of mathematics to the feed salesman and then direct the student in related activities from the following list:	
Invite a feed salesman to the classroom to tell the class how he makes money.	Local feed salesman
An analysis of one of your feeds show that it is .25% salt. How many pounds of salt is there in a ton of this feed?	
Make a list of all the ways you can think of that mathematics is necessary or useful to the feed salesman.	
You receive a 15% commission on your sales of livestock feed. Last month you sold $3435 worth of feed. What is your commission? a. Why do you suppose that salesmen are often paid by commissions rather than a salary? b. How do you think you would rather be paid? Why?	
Last month you earned $625 in commissions. If your rate of commission was 12%, what were your sales?	

Evaluation:

Comments on use:

Jewell Fowler

Subject Area(s) Mathematics

Unit(s) Agri-Business & Natural Resources--
Dairyman

Objective(s):
To find an average. To find the percent of a number. To find the whole when a part is given. To multiply by a decimal. To change pounds to gallons.

Procedure:
The teacher will discuss the importance of mathematics to the dairyman and direct the student in related activities from the list below:

Visit a local dairy and ask the dairyman how many cows he has that are producing now and the total number of pounds of milk they produce per day. Find the average number of pounds per cow per day.

Assume that milk from your dairy tests 4.2% butterfat. How many pounds of butterfat are in 500 pounds of milk?

Milk from your dairy is sold to a firm that makes condensed milk; the volume of fresh milk is reduced about 61% as it is condensed. If 800 pounds of condensed milk was made from the milk from your dairy, how much milk did they buy from you?

About 10.5 pounds of milk are needed to provide sufficient cream for one pound of butter. How many pounds of milk are needed to supply the cream for 500 pounds of butter?

How many gallons of milk is this, to the nearest gallon, if one gallon of milk weighs 8.6 pounds?

Resources and Materials:

Local dairyman

Write to:
American Dairy Association,
20 North Wacker Drive.,
Chicago, IL 60606
U. S. Department of Agriculture, Washington, DC 20250

Department of Commerce
Washington, DC 20230

Evaluation:

Comments on use:

Jewell Fowler

Subject Area(s) Mathematics

Unit(s) Quadrilaterals - "Silent Lecture

Objective(s):
Students will observe properties of quadrilaterals and reach conclusions about these properties.

Procedure:

Directions to students: Maintain total silence and write down during pauses what you have observed.
Directions to teachers:
Place the six small quadrilaterals on the overhead projector and turn on. Remove.

Place two pairs of parallel lines on the screen. Move around to make different sizes and shapes. Form a parallelogram similar to A-2.

Place parallelogram (A-2) in center of boundaries. Leave a while. Take off lines. (Observation 1)

Place lines to bisect the parallelogram both ways. Hold lines and slide A-2 out from under the lines. Mark the congruent segments. (Observation 2) (You can put the short line side by side with the long one to indicate they are not the same length and then put the short line back.) Take off marks to show congruent segments.

Place B-1 and B-2 on diagonal. Slide out diagonals. Separate and switch B-1 and B-2 both ways to show congruent sides. (Observation 3)

Put one triangle on the other. (Observation 4) Then return to parallelogram formed by the two triangles.

Resources and Materials:

Two colors--overhead transparency film
Lightweight cardboard
Overhead projector and screen

Patterns for the forms needed are on the pages following the directions and observations.

Evaluation:

Comments on use:

Subject Area(s) ____________

Unit(s) "Silent Lecture" (con't.)

Objective(s):

Procedure:

Place A-4 on angle of parallelogram, then on opposite angle. Place B-3 on angle of parallelogram, then on opposite angle. (Observation 5)

Place angles used of A-4 and B-3 together. Place line on edge formed. (Observation 6) Clear overhead.

Go back to 2 pairs of parallel lines with parallelogram (A-2) in center. Take out parallelogram. Place right angle symbol on overhead and move lines to make them perpendicular. (You can play with them more.) Place rectangle (A-6) in center. (Observation 7)

Take lines off--put diagonals on. Slide diagonals off and put side by side. (Observation 8) Place diagonals back on rectangle. Clear overhead.

Put the two pairs of parallel lines on overhead again and form a parallelogram. Move lines in. Place rhombus (B-4) inside lines. Remove parallel lines. Place line (side of RH) along one side of rhombus, then adjacent side. (Observation 9)

Place diagonals on rhombus (RH SHORT & RH LONG). Indicate right angles with A-1 and A-3 and right angle symbol. (Observation 10)

Resources and Materials:

Evaluation:

Comments on use:

Subject Area(s) ____________________

Unit(s) "Silent Lecture" (con't.)

Objective(s):

Procedure:

Show adjacent angles formed by lines bisecting the rhombus are congruent using A-1 and A-3. (Observation 11) Clear except for rhombus.

Place parallel lines around rhombus. Move to form a right angle. Mark right angle. Remove rhombus. Insert square (A-5). (Observation 12) Can go on to bisect square, etc., as with rhombus. (Observation 13) (Can also show that a square is a rectangle with a pair of adjacent sides equal.)

Clear screen. Place the six quadrilaterals back on overhead.

Resources and Materials:

Evaluation:

Combine deductions of class members to make a list of observations on the blackboard. Students may have additional observations or have them worded differently, but should have at least the thirteen listed.

Comments on use:

The students may not know the names of the quadrilaterals, but do make the deductions.
The "Silent Lecture" can be given in just under 30 minutes.
Many alterations are possible.

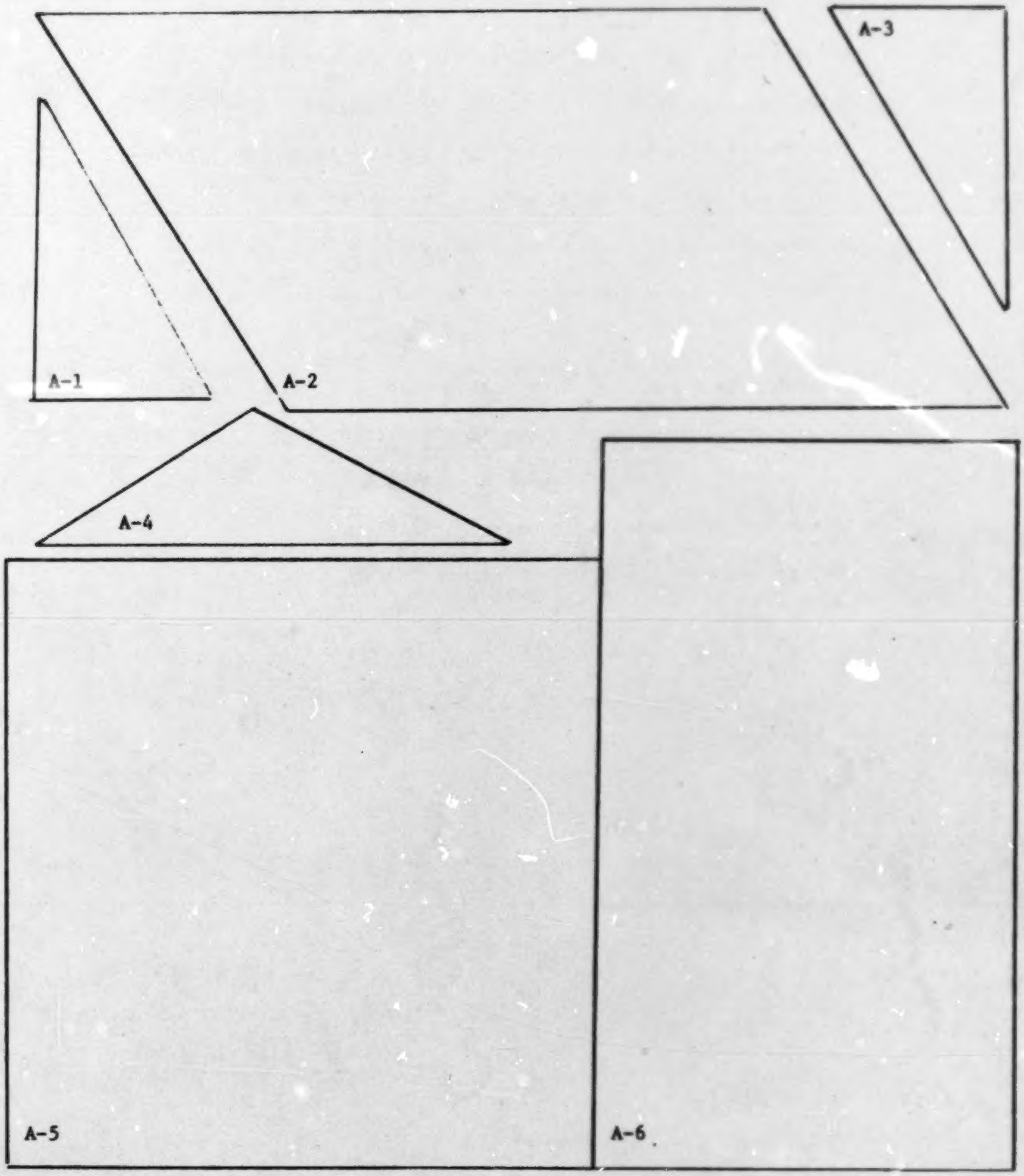
Skip Schulz

OBSERVATIONS

1. A parallelogram is a quadrilateral formed by two pairs of parallel lines.
2. The diagonals of a parallelogram bisect each other.
3. Opposite sides of a parallelogram are congruent.
4. The triangles formed by bisecting a parallelogram are congruent.
5. Opposite angles of a parallelogram are congruent.
6. Adjacent angles of a parallelogram are supplementary.
7. A rectangle is a parallelogram with one right angle.
8. The diagonals of a rectangle are congruent.
9. A rhombus is a parallelogram with a pair of adjacent sides congruent.
10. The diagonals of a rhombus meet to form right angles, are perpendicular.
11. Diagonals bisect the angles of a rhombus.
12. A square is a rhombus with one right angle.
13. The diagonals of a square are perpendicular.

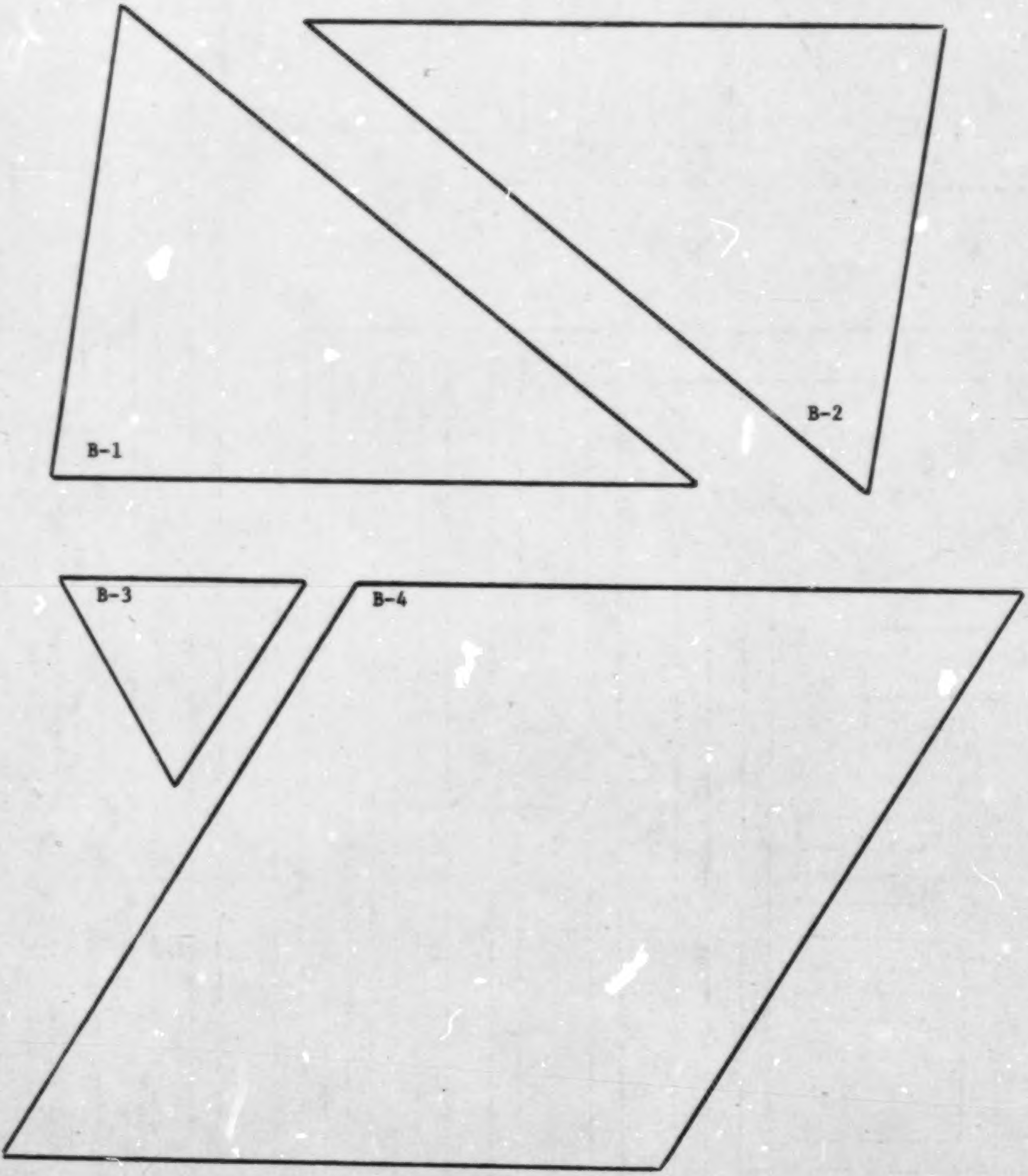
"Silent Lecture" Materials

Cut the following out of overhead transparency film--Color A.


A-3
A-1
A-2
A-4
A-5
A-6

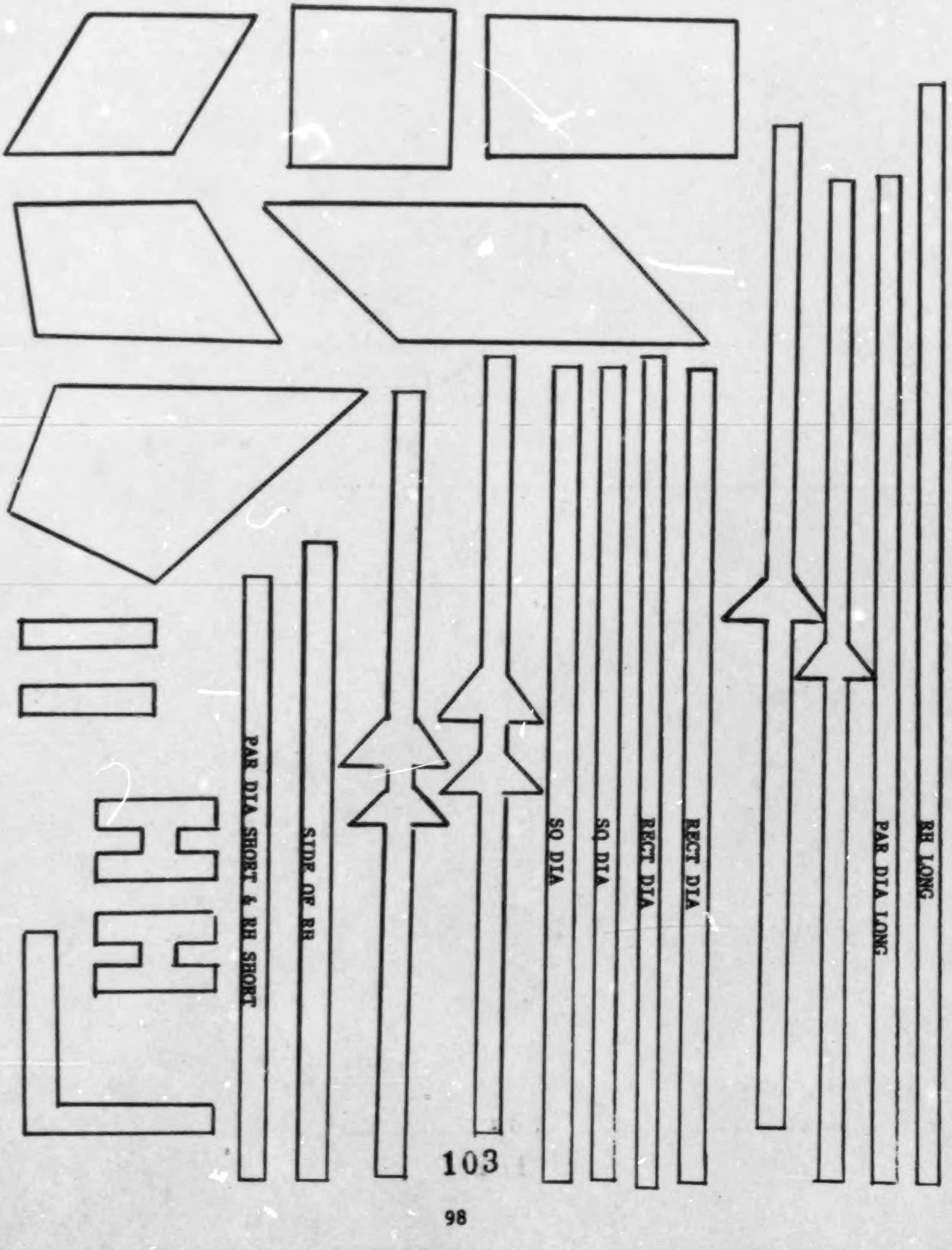
"Silent Lecture" Materials

Cut the following out of overhead transparency film--Color B.



"Silent Lecture" Materials

Cut the following out of lightweight cardboard:


PAR DIA SHORT & RH SHORT
SIDE OF RH
SQ DIA
SQ DIA
RECT DIA
RECT DIA
PAR DIA LONG
RH LONG

Subject Area(s) Mathematics

Unit(s) General Problem Solving

Objective(s):
The student will learn to analyze problems by asking himself or herself the right questions in logical order to reach a solution.

Procedure:
Step I:
With no preliminary discussion, the teacher makes a simple statement establishing a problem, situation

Examples: There's a mess in the kitchen.
There's a mess in the hall.
The car won't run.

Allow 2-4 minutes for students to work individually to write the questions you would need to ask yourself in order to clean (or fix) what is mentioned in the opening statement in the order in which you would need to ask them.

Organize a class response on the blackboard from the students' responses.

Organization should be in proper sequence.
Example:
There's a mess in the hall.

1. What is my job?
2. What is the mess? (liquid or dry?)
3. What is it going to take to clean it up?
4. Do I have it? If answer yes, do it. If answer no . . .
5. Where do I get it?

Then go do the job.

Resources and Materials:
None

Evaluation:

Comments on use:
Start with a very simple statement and use only one such example.
The students usually do a good job of organizing questions necessary to reach a solution.

Skip Schulz

Subject Area(s) Mathematics

Unit(s) General Problem Solving

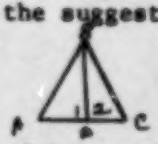
Objective(s):

Procedure:

Step II:

Follow the introductory activity with a very simple application of the suggested technique

Example:



Given: $\angle 1$ and $\angle 2$ are right $\angle$'s
Prove: $\angle 1 \cong \angle 2$

Questions:

1. What's my job?
   Prove 2 $\angle$'s equal.
2. What do I know about it?
   They are right angles
3. Does that help me prove that they are congruent?
   Yes

Then write proof.

Resources and Materials:

Evaluation:

Assign problems.
Check proof of each on bases of all steps being included.

Comments on use:

When students at any point during the course jump into a problem without thinking it through logically, it is affective to remind them by statements such as "There's still a mess in the kitchen." or "You're going to be walking for a long time." depending on the statement used in the introductory activity.

Skip Schulz

Subject Area(s) Math

Unit(s) Rules of Solving Problems

Objective(s):
The student will be able to compare their rules of problem solving to the use of tools.

Procedure:

Have the students give their definitions of use and names for common tools. Then give their use and names in the various trades. Compare the various names and uses. Then name and define the rules for solving problems. The analogy is that name and use differ from person to person but results don't.

Resources and Materials:

Any common tool or even special tools for demonstration.

Evaluation:

Self-evaluation

Comments on use:

Terry Phillips

Subject Area(s) Algebra I

Unit(s) Non-verbal communications

Objective(s):

To improve students' abilities to give and receive non-verbal communication.

Procedure:

Silent lecture on math laws:
- Closure property
- Commutative property
- Associative property
- Distributive property
- Inverse property
- Identity property

Flash one side of law using number, then other side for 3 minutes. Then show total law. Have students write down what they find. Then let students do others.

Resources and Materials:

Overhead projector
Overlays

Evaluation:

Evaluation is done in a lecture-discussion situation between the students to check on each other's ideas. Teacher then adds anything they have forgotten.

Comments on use:

It's a chance to involve every student regardless if they are shy or very outspoken. And it gives each a chance to succeed.

Terry Phillips

Subject Area(s) Math

Unit(s) Basic Skills

Objective(s):

To increase addition, subtraction, division and multiplication skills.

Procedure:	Resources and Materials:
A math bee with teams at the blackboard. Problems in addition, subtraction, multiplication, and division would be given to each team at the same time and the team which got the correct answer first gets a point. A team for each skill could be set up. The team at the end of two days which has accumulated the most points will be allowed to work in a desired math project.	Math texts for problems

Evaluation:

Whoever wins gets to choose what to do next.

Comments on use:

It has worked very well in increasing those skills which were being ignored.

Terry Phillips

Subject Area(s) Geometry

Unit(s) Logic

Objective(s):
The student will see the practical use of logic.

Procedure:

Role-play various people, real-life situations that require reasons for doing something. Examples: Student coming late to class, he would give reasons and class might examine those reasons to see if they are valid.

Resources and Materials:

Textbook material on logic

Evaluation:

Student's evaluate each other on the validity of the logic.

Comments on use:

Would also work as set induction before reading about logic.
Can be used with any instance that requires use of basics of logic.

Terry Phillips

Subject Area(s) Mathematics (Pre-Algebra)

Unit(s) Life Unit

Objective(s):
To make decisions based on information.
To see the relationship between income and life styles.
To understand the role of leisure time.
To be able to communicate with others.
To have knowledge of the economic system in society.

Procedure:

A one-month unit on the financial responsibilities of marriage started by establishing partners--this could also be two students planning on sharing an apartment. Each pair of students was then instructed to find housing, set up a household, get utilities, buy consumer goods, plan menus and determine cost, set up a checking account and buy insurance. Some students chose to also plan ways of saving and investing money.

All students contributed to compile a bank of both good and bad events, such as unexpected medical bills, a strike, etc. Each student drew two during the unit and had to deal with them effectively.

Areas that might be included: honeymoon costs, setting up a household, utilities, menus and cost, insurance, ways of saving/investing money.
(Some of the activities used are included on the following pages.) Each pair of students kept a notebook--some used a purchased cash book--and a file folder of records.
Role playing situations could be used. Examples: buying a car, house, furniture, etc., or renting an apartment

Resources and Materials:

Textbook: Modern School Mathematics
Pre-Algebra, Houghton-Mifflin
Mathematics for Daily Living
McCormick Mathers Pub. Co.
Inc., Cincinnati, OH 45202
Tape recorder and tapes (used to record some of the role playing situations)
"Be Informed" Series
New Readers Press
Box 131
Syracuse, NY 13210

Evaluation:

Students evaluated each other's folders.

Comments on use:

The students really enjoyed this and worked willing on the project.

Terry Phillips

Subject Area(s) Mathematics

Unit(s) Life Unit/Insurance

Objective(s):

To become aware of different types of insurance and different aspects of some type of policy from different companies. (Students also see how agents deal with each other.)

Procedure:

Each student determined coverage desired and "shopped" for insurance, got necessary forms and filled them out to be added to their folders.

A panel of insurance agents was invited to the class to discuss strengths and weaknesses and to answer student questions.

Resources and Materials:

The teacher could gather various information and applications or have students do this.

Four or five local insurance agents.

Evaluation:

Comments on use:

The students showed considerable interest in insurance and had many pointed questions.

Terry Phillips

Subject Area(s) Mathematics

Unit(s) Life Unit/Buying Appliances

Objective(s):

To experience buying an appliance.
To become aware of what to look for and ask about when buying an appliance.

Procedure:

Role play buying new or used appliances. Situations can be set up with couple disagreeing on what they want, etc. Switch roles so that students see both sides. Having an appliance salesman visit the class would also be beneficial. Math is used to figure cost, set up payments, etc.

Resources and Materials:

Appliances to use in role playing situation.

Evaluation:

Activity followed by group discussion to determine what both buyers and sellers could do to improve.

Comments on use:

The sellers were really challenged to convince the buyer that the appliance was what they needed.

Terry Phillips

Subject Area(s) Mathematics

Unit(s) Buying a Car

Objective(s):

To experience car buying through role playing.

Procedure:

Each student role played a car salesman trying to sell a car. Then the roles were reversed. Different types of buyers and sellers were represented.

Having a car salesman visit the class would also be very beneficial.

Resources and Materials:

Evaluation:

The students discussed how they could better present themselves as a buyer or seller. They also figured car payments, etc., and how they would fit their budget.

Comments on use:

Terry Phillips

Subject Area(s) Algebra I

Unit(s) Money

Objective(s):

To learn to use money properly.

Procedure:

Set up a mock bank in which the students deposit money, cash checks, discuss loans, all on their own level as students. Advisors on money matters will be assigned to help each student use his or her money wisely. All expenses are recorded at the bank on what the student spent money for that day. At the end of one week, each student will be evaluated by a panel of students on how well their money was spent. If it is found that the student did not spend his or her money wisely they'll do the assignment again.

Resources and Materials:

"Banking and Banking Services" kit, Changing Times Education Service

"Be Informed" series, New Readers Press, Publishing Div. of Laubach Literacy, Inc., Box 131, Syracuse, NY 13210

"Money"

"What Is a Bank?"

"Banking"

"Your Checking Account"

"Reconciling Your Bank Statement"

"Saving Through Banking"

"Review Exercises"

Evaluation:

Comments on use:

The students found that the first time they did the assignment, they failed, but the second time they showed more interest and achieved good results. The students in another class had a banker for a guest speaker. This unit caused these students to ask to have a banker come to speak to them as well. This could also be included in Life Unit.

Terry Phillips

Subject Area(s) Math

Unit(s) Use of Time

Objective(s):

To develop a sense of need to use time wisely.

Procedure:

Have students plan a trip using various means of getting to a plan with a minimum of wasted time. Uses distance formula d = rt from algebra. Have them use the schedules to map out best route with best time spent.

Resources and Materials:

Airline schedules
Bus schedules
Train schedules

Evaluation:

Is done by seeing who used their time to the best advantage.

Comments on use:

Developed addition skills, use of time and logic.

Terry Phillips

Subject Area(s) Math

Unit(s) Banking

Objective(s):
To become aware of the various banking services available.

Procedure:

A banker discussed various aspects of banking with the class, such as how to get a loan and make payments, how to set up a savings account, pay for a car, and how to protect themselves in money matters.

Resources and Materials:

Banker

The MO Association of Bankers will provide a speaker if you cannot find someone in your vicinity.

Evaluation:

Comments on use:

The students showed a concern of how the inflation of the American dollar made banking a challenging job.

Terry Phillips

Subject Area(s) Mathematics

Unit(s) Consumer Math (Insurance)

Objective(s):

To become aware of mathematics used in field of insurance.

Procedure:

Prepare class for a guest speaker from the insurance field.
Introduce and define basic terms such as comprehensive, liability, collision, deductible, no-fault, claim, premium.
Have class make list of questions they would like to ask the guest speaker.
Have speaker from insurance field.
After having speaker have class discussion on how mathematics is used and their opinion of speaker

Resources and Materials:

Consumer Mathematics
2nd Edition, Fankford, Goe as source for terms and as preporatory unit for speaker.

As speaker used Mr. Bob McDonough with American Family Insurance

Evaluation:

The evaluation of effectiveness was done in class the following day with class discussion.

Comments on use:

Students really participated well in class both when speaker was here and in discussion the following day. I felt this was due largely to the fact they knew something of the subject before hand.

Ruth Ann Walk

Subject Area(s) Math

Unit(s) Consumer Credit

Objective(s):

Have the student explore different possibilities for credit.

Procedure:

Set up problem where student can buy a television set for $300. Give him several alternative choices and have him list choices in order of preference and give reason why.

Choices might be:

1. Borrow full amount from bank and mortgage his/her car--payment over 1 year, 10% interest.
2. Finance full amount from TV sales store--payments over 2 year, 18% interest per year.
3. Borrow full amount from small loan house--payments over 2½ years, 20% interest.
4. Take money from savings and repay yourself in $25 payments for 1 year.

Resources and Materials:

Whatever situation the teacher choses to use.

Evaluation:

Comments on use:

Students did some thinking as to size of payment vs. number of payments vs. interest rate or finance charge.

Ruth Ann Walk

Subject Area(s) Math

Unit(s) Consumer Math (Checking Account)

Objective(s):

To learn to balance a checkbook.

Procedure:

Give students an amount of money and a number of expenses and income during a two month or more period. Have them balance checkbook and figure in service charge.

Resources and Materials:

Ideally, if a student is employed have him work with his own books. This promps more interest and shows more responsibility.

Evaluation:

Comments on use:

Those students who actually used their own figures seemed more interested and gained more from the activity.

Ruth Ann Walk

Subject Area(s) Math

Unit(s) Consumer Math (Budgeting)

Objective(s):

Teach the reality of budgeting money.

Procedure:

Allow each student an amount of money, example $150.

Have him list the different items he would like to buy.

Now have him arrange the list by preference and what he needs most.

Resources and Materials:

Evaluation:

Comments on use:

I found the student usually wanted more than the $150 could buy. Usually they did some good reasoning as to why one thing came first and another last, etc.

Ruth Ann Walk

Subject Area(s) Math

Unit(s) Purchasing Consumer Goods

Objective(s):

The student will be able to find the cheaper items and the best buys when given a few choices.

Procedure:

A chart was made on the board like this:

Store	Item	Quantity	Price

This chart should be drawn on the blackboard twice.

Each student was given a few newspapers.

When a student found an item he might buy in the future, he put the information on the board on the left side. The right side was then filled by someone who found an ad for the same item only at a different store. About 3 big boards were full of information which I copied and ran off for the students the next day to figure price per pound or price per item, etc. We then figured and discussed why do the prices vary, were the cheaper items a good buy, etc.

Resources and Materials:

Newspapers

Evaluation:

The student could be given a chart with several items listed and told to compare them.

Comments on use:

This works very well because the students are allowed to get up and participate the whole hour. It also stimulates good discussion the next day.

Beth Phillips

Subject Area(s) Math

Unit(s) Consumer Math

Objective(s):

The student will be able to write a check, keep a checkbook balanced, and know the operations of charges on keeping a checking account.

Procedure:

Give students blank checks and register to keep track of checks.

Give students amount to put in bank.

Inform him of the bank rules and charges.

Give out newspapers. Pick out ads and "buy" different things keeping track of his checking account.

Resources and Materials:

Checks
Magazines
Newspapers

Evaluation:

The first evaluation is made by checking their balance. The second would be made by giving a test with checks printed on it and a register.

Comments on use:

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Beth Phillips

Subject Area(s) Math

Unit(s) Traveling by Car

Objective(s):
The student will have a review and also become aware of the expenses of a trip by car.

Procedure:
Students will write a paper on an auto trip they would like to take. It will be mandatory that they include such things as kind of car, miles per gallon it gets, how many miles they will go, how much gas will cost, how many days it will take, meal cost, lodging cost, average mph and total cost of trip.

Resources and Materials:
Give students cost of gasoline per gallon.

Evaluation:
The work itself is a good evaluation for the concepts of miles per gallon, average mph, etc.

Comments on use:
The students seemed excited about planning trips but very dismayed when they figured the total cost.

Beth Phillips

Subject Area(s) Math

Unit(s) Military Service

Objective(s):

To learn more about the military service as it relates to mathematics.

Procedure:	Resources and Materials:
A guest speaker, a retired Air Force officer, was invited during Career Education Week to discuss the use of math in the Air Force. Although not his main reason for speaking, he also discussed how education directly relates to rank in the service and how the same "class system" is present in non-military life. He stressed the importance of education and how it affects getting a job.	Guest speaker

Evaluation:

Comments on use:

The students had many questions and learned a great deal about how important further education is in helping to get a good job.

Terry Phillips

Subject Area(s) Math

Unit(s) Careers

Objective(s):

To expand knowledge of how math is used in specific jobs.

Procedure:

The classes were put into groups with each group choosing an occupation to explore in regard to how math is used in that occupation. Occupations chosen incuded mechanics, doctors, nurses, engineers, carpenters, bankers, real estate sales, insurance sales, car sales, small business, and teaching.

Each group presented the information to the class through a panel discussion.

Resources and Materials:

Resource people from occupations to make up panel to present information.

Students might do some interviewing and/or research and make up the panel themselves if resource people are not available to come into the classroom.

Evaluation:

Comments on use:

Terry Phillips

Subject Area(s) Math

Unit(s) Mechanics

Objective(s):

To give the girls information about a job which was before only for men--career awareness.

Procedure:

The boys in class brought in motors that were of various types and instructed the girls in their disassembly, using metric and standard tools.

Resources and Materials:

Motorcycle (metric)
Lawn mower (standard)
Car foreign (metric)
Metric and standard tools

Evaluation:

Comments on use:

Ask that the motors be cleaned first.

Terry Phillips

Subject Area(s) Geometry

Unit(s) Career Awareness

Objective(s):

To become informed on basic needs and requirements of various careers.

Procedure:

Find out what job each student wants to have. They discuss what they feel is necessary for that job. When they need additional information, bring in speakers, filmstrips, books, and magazines to add to what they know about their job choice.

Resources and Materials:

Career information on specific jobs, filmstrips, books, magazines

Evaluation:

Evaluation of the success is personal. Each student determines if the unit has been a success or not.

Comments on use:

The students are very interested in the unit and are bringing in information for other students that they themselves have. This was done as a separate unit to relate math to job choices and also as a basis for the end-of-the year review for the sophomores.

Terry Phillips

Subject Area(s) Math

Unit(s) History of Math

Objective(s):
The student will gain an appreciation for the development of mathematics field.

Procedure:	Resources and Materials:
Have students choose or assign ancient mathematician for them to role-play, expressing the mathematician views as their own, meeting each other and explaining and exchanging views.	Previous research in math history.

Evaluation:
Class discussion following role-playing.

Comments on use:

Terry Phillips

Subject Area(s) Pre-Algebra

Unit(s) Measuring Skills

Objective(s):

Give the boys a practical experience with what was before only a woman's job.

Procedure:

The girls will instruct the boys in the proper use of homemaking tools by showing them how to bake a cake using metric and standard units.

Resources and Materials:

Metric and standard measuring tools

Ingredients

Containers--pans, bowls, etc.

Evaluation:

Material would be included when testing over measurement.

Comments on use:

Terry Phillips

Subject Area(s) Math

Unit(s) Measuring

Objective(s):

The students will gain experience in measuring.

Procedure:	Resources and Materials:
Go to local library or obtain blueprints there or from magazines. Study the plans most drawn to scale. Check the accuracy of the lengths of important lines on the blueprints using an architect's rule.	Architect's rule

Evaluation:

Have measuring skills on test.

Comments on use:

Could use regular ruler if blueprints aren't in architect's rule.

Beth Phillips

Subject Area(s) Math

Unit(s) Liquid Measurement

Objective(s):

To become aware of how heating and cooling, etc., affect liquids.

Procedure:

Each student will be given various liquids and measuring tools and asked to measure them. The liquids will be combined, divided in half, heated, and cooled, and tested.

The results will be recorded by a student. Both metric and standard tools could be used.

Resources and Materials:

Liquid measures
Liquids
Heating element
Ice

Evaluation:

The discussion of the liquids and their changes will be oral or by a panel with the written results read.

Comments on use:

The students liked it and related it to their science.

Terry Phillips

Subject Area(s) Math

Unit(s) Metric Measurement

Objective(s):

To learn the mechanical skill of measuring with a meter stick.

Procedure:

Groups of 4 students, each with a meter stick measuring the following things as a group.

1. the floor
2. the door
3. each other
4. a book

Then compare their accuracy.

Resources and Materials:

Meter sticks

Evaluation:

After each group compiles their data, they compare answers.

Comments on use:

A good action project.

Terry Phillips

Subject Area(s) General Math (Trigonometr
Geometry, Algebra)
Unit(s) Rocketry

Objective(s):

To see a practical use of math in rockets and the future of space science.

Procedure:

Build model rockets. Fly them, test them and design new ones. Use measurements, logic. Use trigonometry to determine height of rocket's path, fuel and propulsion. Mechanics is used to determine proper size of engine to use. Electricity is used to supply power to fuel igniter. Develop a sense of pride in finishing a project. In building the rockets, each student is supervised and instructed in the proper techniques of building, stress factors, load limits, engine requirements, paint types, and center of gravity. The kits are easy enough so that a slow student can build one easily and yet other kits are hard enough for the more demanding student. The student will shoot off the rocket and through trigonometry determine how high it went. After which, they will compare their data on height, weight, engines, and design with each other.

Resources and Materials:

Estes or Centuri model rockets
Paint
Glue
Launch kit

Evaluation:

The students seem to really want to get involved in this and want to see what they can do with the rockets.

Comments on use:

Brings a practical sense to math by having to use math.

Terry Phillips

Subject Area(s) Math

Unit(s) Model Aircraft Building

Objective(s):

To learn more about recreational activities which might complement a person's work skills. To develop knowledge of a skill with spatial relationships, measuring and aerodynamics.

Procedure:

The students select a model aircraft of either plastic or balsa and build it according to the plans given. They'll also paint it. In building the kits, they'll receive instruction in proper techniques of builders. This building process will take about one week and will be somewhat messy.

Resources and Materials:

Plastic or balsa model kits
Glue
Paint
Wire
Engine
Gas
Fuel
Battery
Building tools

Evaluation:

Vote by students on best project.

Comments on use:

This unit develops skills in reading, following instructions, goal achievement, manual dexterity, measurement, color and imagination.

Terry Phillips

Subject Area(s) Algebra I

Unit(s) Stress Factors--Engineering

Objective(s):

To learn about practical engineering.

Procedure:

The students will be assigned into groups of three. Each group will be given 1 pound of plaster of paris, six feet piano wire, 1/2 pound of sand and are instructed to build a bridge. When they achieve its construction, all the while keeping careful records on procedure, weight will be added to the bridge until it collapses.

Resources and Materials:

- Plaster
- Sand
- Water
- Wire
- Lead weights

Evaluation:

The most weight taken before collapse will determine the best bridge.

Comments on use:

The student will have a chance to develop any ideas on how they believe a bridge should be built.

Terry Phillips

Subject Area(s) Algebra I

Unit(s) Similar triangles

Objective(s):

To learn how en engineer uses math.

Procedure:

A guest speaker discussed civil engineering and showed the students how algebra was used in designing and building a home.

Stress points in construction were emphasized and information on various types of materials was included.

Actually illustrating material already covered by students in problems and diagrams during the talk helped students relate what they were studying to some useful purpose.

Resources and Materials:

Engineer--This speaker was an engineering student from CMSU.
Blackboard for diagrams

Evaluation:

Comments on use:

Two girls decided to take shop because of the talk.

Terry Phillips

Subject Area(s) Math

Unit(s) Spatial Relationships

Objective(s): To develop a sense of space and order in construction of a model without the use of instructions.

Procedure:

Each student gets a plastic model kit and puts it together without the use of plans. They can put it together as the kit was intended or as something else entirely.

Resources and Materials:

Plastic model kit
Glue
Paint

Evaluation:
The reaction at first was confusion but when they started to work, the results were interesting and fun for the student.

Comments on use:
The student was forced to make a plan of action himself without help. It can develop a sense of need for organization and recognition that certain parts or things can go together in different ways.

Terry Phillips

Subject Area(s) Geometry

Unit(s) Geometric Shapes and Forms

Objective(s):

The student will become aware of all the different geometric shapes.

Procedure:

Design and build a set of chess pieces that:
a. consist of combinations of geometric shapes and
b. indicate the moves which the pieces can make by the shapes of the pieces themselves.

Resources and Materials:

Rules for those students not familiar with chess.
Materials to build chess pieces--students would choose these.

Evaluation:

Evaluate the forms the students used and how well they move with respect to their shape.

Comments on use:

Beth Phillips

Subject Area(s) Math

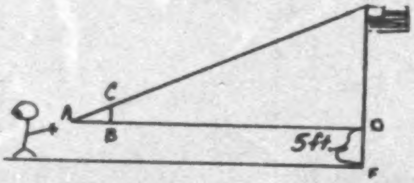
Unit(s) Similar Polygons

Objective(s):

The student will be able to set up and solve proportions using similar triangles.

Procedure:

The students are taken outside to measure heights of, for example, flag poles, church steeples, signs, etc.



The student can hold a ruler vertically with his arm outstretched enough so that he can line up the top of the flag pole. The distance from where he is standing to the pole can be measured by walking it off. The computation is based on the idea that the $\triangle ABC$ is similar to $\triangle ADE$.
Side AB is measured and seen to be, for simple calculation purposes, 2 feet. BC is the length of the foot rule. AD is measured by walking off the distance say for example 50 feet.
The following is done.

$\frac{AB}{AD} = \frac{BC}{DE}$ $\frac{2}{50} = \frac{1}{DE}$ $2DE = 50$
$DE = 25$

Add the height of the student to get final answer

Resources and Materials:

Rulers, one for each student

Evaluation:
Give students various similar triangles and have them find the missing side.

Comments on use:
Works extremely well. Students are surprised at the accuracy.

Beth Phillips

Subject Area(s) Math

Unit(s) Symmetry

Objective(s):

The student will recognize symmetry in architecture and in their lives.

Procedure:

Take students outside. Have them sketch symmetric forms. Afterwards discuss the different forms.

Resources and Materials:

Evaluation:

See that all forms sketched were symmetrical.

Comments on use:

Beth Phillips

Subject Area(s) Math

Unit(s) Geometry

Objective(s):

To find sources for information to utilize these resources.

Procedure:

Problems related to volume were assigned:

1. Find the volume of the city water tower.
2. Where does the water come from?
3. Find the volume of water between two points in the Osage River.

The students were to find a source to get this information and then asked to reach the answers mathematically after obtaining the necessary information.

Resources and Materials:

City engineer
Corps of Engineers
Engineering student in college
Other resource people might be utilized depending on the type of problems used.

Evaluation:

Check accuracy of information located and mathematical checks.

Comments on use:

The use of this was primarily a decision-making and problem solving activity:

1. Where do I go to get the information?
2. Who do I ask? Are they qualified?
3. What is the answer to the problem?

Terry Phillips

Subject Area(s) Geometry

Unit(s) Construction of 2- and 3-dimensional geometric shapes

Objective(s):

To improve understanding of geometric shapes.

Procedure:

The students will build various geometric shapes with tinker toys and then measure and describe what they find about them. They will then combine shapes to see if they can get other shapes and explain how this can happen.

Resources and Materials:

Large box of tinker toys

Evaluation:

They evaluate themselves by pointing out to each other where changes could be made to improve their presentation.

Comments on use:

The students worked well with this and soon overcame the attitude that it was childish.

Terry Phillips

Subject Area(s) Geometry

Unit(s) Geometric Shapes

Objective(s):

To learn to recognize geometric shapes around each person's own environment.

Procedure:

The students will first discuss the basic shapes--square, triangle, rectangle--and then go outside and find as many examples of each as they can. Then they'll discuss circles, ellipses, hyperbolas, parabolas, lines, planes and go out and find examples of these. When the lists are finished, each group will compare to see if some shapes overlap into other areas and discuss why. After this, they go out one more time to see if they can find any others.

Resources and Materials:

Textbook background material on geometric shapes

Evaluation:

Comments on use:

Terry Phillips

Subject Area(s) Math

Unit(s) Coordinate Space

Objective(s):
Understanding and application of ordered pairs. (graphing)

Procedure:

Place a 5 x 5 system (dots) on chalkboard.

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. . . . .
. . . . .
. . . . .
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Instruct students of the rules.
a) Establish order of response.
b) The response is an ordered pair. Example:
   1, 3--5, 7--etc.
c) Silence is a necessity unless it is your turn
   to respond.

Set the pattern of recording their responses. If boy vs. girl, use a and b. If right side of room vs. left side, r and l are used.

The letter used is placed over the dot which corresponds to the ordered pair from a student. If you cannot mark a response, say so and go to next student.

The origin may be marked or not. If not marked, you start counting over and up or over and down or left and up. This depends on the location that you have chosen for the unmarked origin.

Resources and Materials:

Blackboard and chalk

Evaluation:

Comments on use:

Subject Area(s) Math

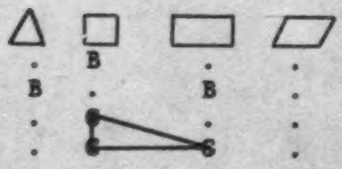
Unit(s) Coordinate Space (continued)

Objective(s):

Procedure:

Game continues until one group has 3 or 4 or 5 in a line on the gird. The number required may vary according to the classes or the time it is used.

Letter order pairs can be used. Geometric figures can be used. If geometric figures are used, I usually wait until one of the figures is formed. Example: If △ □ ▭ ▱ are used, then when a team accomplishes one of these, the game is over.



The girl responses mark a △ from their location, so I mark a △ on the gird and score 1 point for girls and go again.

Resources and Materials:

Evaluation:

Comments on use:

I have used this ten or twelve times and it has been good.

Skip Schulz

Subject Area(s) Math

Unit(s) Computers

Objective(s):

The student will understand base 2 through use of a light board.

Procedure:	Resources and Materials:
Have students build a light board that will symbolize a computer read-out. Have them set up various inputs to show how computers read out that input. Students can convert alphabet to numbers and then to base 2.	Lights, wire, batteries, solder, peg board, switches. Previous instruction in base 2.

Evaluation:

In a performance score--a time limit of five minutes with successfully getting a certain number of problems right.

Comments on use:

Can involve students interested in electricity, mechanics, and computer programming as well as other areas.

Terry Phillips

Subject Area(s) Math

Unit(s) Computer Science

Objective(s):

To become familiar with computers, their production and the careers related to computers.

Procedure:

Take students to Computer Center located in Sedalia-Democrat building.

Resources and Materials:

Transportation to Computer Center

Evaluation:

Discuss what they saw.

Comments on use:

They give a very informative and impressive tour at the Computer Center which lasts about a class period.

Beth Phillips

Subject Area(s) Math

Unit(s) Computer Science

Objective(s):

The student will write a flow chart.

Procedure:

Have students think of a computer program that might be used in the area they are interested in. Then, if not too complicated, have them draw a flow chart in accordance with the program.

Resources and Materials:

Templates, one for each student

Evaluation:

The teacher can pick up the flow charts and correct them like any other homework papers.

Comments on use:

Beth Phillips

Subject Area(s) Algebra II or Other Math Classes

Unit(s) Base Two

Objective(s):

To understand the use of base two in computers.

Procedure:

Have the students stand on certain floor tiles or areas in the class. Let the boys represent a one and the girls represent a zero. Then have them arrange themselves in any order to show how each place has a value and that the sum of the values is a base ten number. Rearrange several times and soon the students will enjoy finding different combinations and getting different answers.

Resources and Materials:

Evaluation:

Teacher evaluates an answer as correct or incorrect.

Comments on use:

The students like to be physically involved and work well in the situation.

Terry Phillips

Subject Area(s) Math

Unit(s) Statistics

Objective(s):

To learn how to develop statistical information.

Procedure:

Have the students survey the license plate numbers of all the cars on the school grounds. Have them draw up conclusions about the numbers, their types of cars, their color, and who owns them. Show how frequent some things come up.

Resources and Materials:

Evaluation:

Discussion on results of survey and how valid it was.

Comments on use:

The students liked getting out of class and found many surprising results of the survey.

Terry Phillips

Subject Area(s) Math

Unit(s) Statistical Studies

Objective(s):

To learn what the community desires out of math in the schools.

Procedure:

The class will survey the town on the question "What do you think should be taught in high school math for a person to get a job?"
The answers will be recorded by tape or by written statements and the results will be compiled and analyzed statistically.

Resources and Materials:

Evaluation:

The students will examine and discuss the various answers to see if the school is doing what the community feels it should in the math area.

Comments on use:

All names would be kept out, only answers would be studied and only those people who wanted to answer would be taken as examples.

Terry Phillips

Subject Area(s) Career Math

Unit(s) Understanding Statistical Information

Objective(s):

The student will be able to find the mean, mode, and median. The student will be able to make and read a bar graph.

Procedure:

Have each student make a bar graph of his spendings each day and hang them on the bulletin board. At the end of two weeks, take them down and have students find mode, mean, and median.
Have students turn them in after they have written a paragraph about the things they found out about themselves.

Resources and Materials:

Just room enough to hang 30 graphs

Tacks or tape

Evaluation:

Several bar graphs in which the student has to find mean, mode, and median and also he will have to read information off a graph.

Comments on use:

Remind students every day to do this. Make sure they graph $0 if they didn't spend anything.

Beth Phillips

Subject Area(s) Math

Unit(s) Ratio & Proportion
or Map Readings to Scale

Objective(s):

The students will gain experience in drawing to scale and using a ruler.

Procedure:

Students will draw floor plans of the house they would like. Each room, yard, etc., must be drawn to scale.

Resources and Materials:

Evaluation:

Check the accuracy of their measurements.

Comments on use:

A shorter version would be if the teacher drew and gave each student a floor plan not drawn to scale and had the students redraw it to scale.

Beth Phillips

Subject Area(s) Math

Unit(s) Graphing Speed and Fuel Consumption

Objective(s):

The student will gain experience in graphing and how speed affects fuel consumption.

Procedure:

Find out how long a power lawn mower will run at "lo" "med" and "high" speed, using the same amount of fuel at each speed. Show the findings in a bar graph. Think of other ways for drivers to conserve gasoline in their automobiles.

Resources and Materials:

Lawn mower and gasoline

Evaluation:

Check bar graph for accuracy.

Comments on use:

Have everything ready and perhaps a lawn close to school to mow. Students could do this at home or with building maintenance men and report findings to class.

Beth Phillips

FIELD TRIP SITES
and GUEST SPEAKERS

GUEST SPEAKER AND FIELD TRIP SITE LISTING

NAME	ADDRESS	CONTACT REPRESENTATIVE	TELEPHONE	FIELD TRIP	GROUP SIZE	GRADE LEVEL	GUEST SPEAKER
Adco	900 W. Main Sedalia, MO	Dr. Alexander	826-3300	Yes	1-6	9-12	No
Allstate Insurance Co.	4800 E. 63rd Kansas City, MO	Mr. John Irish	333-6800	Yes	20	11-16	No
American Electrical Industries	Highway 50 Sedalia, MO	Mr. Russ Woodyard	827-1712	Yes	30	6-12	Yes
Archias Floral Co.	4th & Park Sedalia, MO	Mr. Don King	826-4000	Yes	20	K-12	Yes
Artist	203 N. Jefferson Sedalia, MO	Ms. Thelma Hansen	886-8464	No	0	7-12	Yes
Attorney at Law	Cole Camp, MO	Mr. Pete Stelling	668-4858	No	0	0	Yes
Attorney at Law	Warsaw, MO	Mr. Edwin F. Brady	438-5116	Yes	4-5	9-12	Yes
Attorney at Law	Farmer's Savings Bank Marshall, MO	Mr. Larry McClure	886-6986	No	0	7-12	Yes
Ault's Skelly Station	1570 S. Kentucky Marshall, MO	Mr. Bob Ault	886-6792	No	0	7-12	No
B & E Market	1701 S. Kentucky Marshall, MO	Mr. Jim Dick	886-2188	Yes	30	3-12	No
Banges	78 S. Jefferson Marshall, MO	Ms. Dolly Kiser	886-3716	No	0	7-12	Yes
Banquet Foods	253 W. Marion St. Marshall, MO	Mr. Caton Martin	886-3301	Yes	20	4-9	Possibly
Benton County Enterprise	Warsaw, MO	Mr. Mahlon White	438-6312	Yes	4-5	9-12	Possibly
Benton County R-I School	Cole Camp, MO	Mr. Vergil Oglevie	668-4427	No	0	0	Possibly

NAME	ADDRESS	CONTACT REPRESENTATIVE	TELEPHONE	FIELD TRIP	GROUP SIZE	GRADE LEVEL	GUEST SPEAKER
Benton County R-IX	Warsaw, MO	Dr. John Boise	438-7351	No	0	8-10	Yes
Benton County Sheriff's Dept.	Warsaw, MO	Mr. Robert Bresheears	438-5252	Yes	5-6	9-10	Yes
Binghams Super Saver	La Monte, MO	Mrs. Bingham	347-5426	No	0	0	No
Body Shop	Cole Camp, MO	Mr. David Luetjen	668-3155	Yes	2-4	9-10	No
Bohling Grocery	Cole Camp, MO	Mr. E. G. Bohling		No	0	0	Possibly
Boonslick Regional Library	Sixth & Lamine Sedalia, MO	Ms. V. Corley	826-6195	Yes	20	K-9	Possibly
Borchers & Heimsoth	Cole Camp, MO	Mr. Ervin Borchers	668-4923	No	0	0	No
Bothwell Hospital Physical Therapy	Sedalia, MO	Ms. Nevin Almquist	826-8833	Yes	7-15	7-12	Yes
Bothwell Hospital	Sedalia, MO	Ms. Marie Nicholson	826-8833	Yes	20	12-16	No
Breech Academy - TWA	6300 Lamar Avenue Mission, KS	Ms. Mickey Holiday	842-4000	Yes	20	11-16	Yes
Brick Mason	RFD 3 Warsaw, MO	Mr. Lee Slavens	438-5360	No	0	0	Possibly
Broadway Car Wash	310 W. Broadway Sedalia, MO	Mr. Dale Arms	826-0375	Yes	25-30	1-12	No
Broadway Lanes, Inc.	2119 W. Broadway Sedalia, MO	Ms. Edith Simons	827-0404	Yes	Large	K-14	Possibly
Brown, McCloskey, Buckley	309 E. 5th St. Sedalia, MO	Ms. Mabel Glenn	826-7373	No	0	0	No
Business Mens Assurance	BMS Building Kansas City, MO	Ms. Almeta Wilcher	753-8000	Yes	20	11-16	No

NAME	ADDRESS	CONTACT REPRESENTATIVE	TELEPHONE	FIELD TRIP	GROUP SIZE	GRADE LEVEL	GUEST SPEAKER
C-B Shop	Cole Camp, MO	Mr. Dave Wordeman		Yes	4	9-12	No
C. W. Flower	219 S. Ohio Sedalia, MO	Mrs. Austin	826-3200	Yes	15-20	11-16	Yes
Cablevision, Inc.	600 S. Osage Sedalia, MO	Mr. Lynn Harrison	826-0933	Yes	20	5-9	Possibly
Cargill Incorporated	Marshall, MO	Mr. Jack Hartwick	886-7473	Yes	20-25	9^+	Possibly
Cargill Nutrena Feeds	Smithton, MO	Mr. Gene Hudiburg	343-5319	Yes	10	7-12	Yes
Cash U. S. Super	Cole Camp, MO	Mr. Jim Cash	668-3700	Possibly	0	0	No
City Offices	214 N. Lafayette Marshall, MO	Mr. Ron Collins	886-2226	No	0	7-12	Yes
Classic Studio	6th & Kentucky Sedalia, MO	Mr. Ed Brummett	826-8888	Yes	5-10	7-12	Yes
Clay Mead Furniture	Highway 65 Marshall, MO	Ms. Kay Perkins	886-5354	No	0	7-12	Yes
Coffman's Marina	Highway 65 South Sedalia, MO	Mr. John Smith	827-3692	Yes	1-6	9-12	No
Commerce Bank	10th & Walnut Kansas City, MO	Mr. John Wells	234-2000	Yes	20	11-16	No
Consumers Supermarket	Hancock & Broadway Sedalia, MO	Mr. Bill Smillie	827-3190	Yes	15	K-12	Yes
Courts Lawn and Garden	Marshall, MO	Mr. Delford Thompson	886-5000	No	0	7-12	Yes
Creasy's Insurance Agency	Warsaw, MO	Mr. Gordon Creasy	438-5621	No	0	0	Yes
Dala's Boutique	Tipton, MO	Ms. Dala Yantz	433-2626	No	0	0	Yes
Day Care	321 W. Second Sedalia, MO	Mrs. Zimmerschied	826-5040	Yes	1 a day	0	Yes

NAME	ADDRESS	CONTACT REPRESENTATIVE	TELEPHONE	FIELD TRIP	GROUP SIZE	GRADE LEVEL	GUEST SPEAKER
DeKalb Ag. Research	Marshall, MO	Mr. Don Wert	886-7438	Yes	10-40	5-9	Possibly
DeLong Dry Goods	Warsaw, MO	Mrs. DeLong	438-5307	No	0	0	Possibly
Deluxe Cafe	Cole Camp, MO	Ms. Marie Musser	668-4521	Yes	2-4	9-10	Yes
Democrat News	Marshall, MO	Mr. Jerry Arnett	886-2233	Yes	25	7-9	Yes
Dentist	Warsaw, MO	Dr. Shepardson	438-5421	No	0	0	Possibly
Dentist	1810 W. 11th Sedalia, MO	Dr. Robert Vit	826-5445	No	0	K-12	No
Dentist	Cole Camp, MO	Dr. D. V. Reimsnitter	668-3312	Yes	4-6	9-12	Possibly
Doctor of Osteopathy	1701 S. Lafayette Sedalia, MO	Dr. Joe Bennett	826-6633	Yes	5 at a time, 40 maximum	7-12	Yes
Don's Dive Shop	3312 S. Highway 65 Sedalia, MO	Mr. Don Kabler	826-4681	No	0	8-12	Yes
Don's Welding	Highway 65 South Sedalia, MO	Mr. Don Carr	826-7310	Yes	1-10	8-12	No
Duke Manufacturing	Main & Duke Road Sedalia, MO	Mr. Ivan Stuart	827-2661	Yes	10	4-12	No
Durham Chevrolet	Warsaw, MO	Mr. Floyd Durham	438-5133	Yes	10	8-12	Yes
Eckhoff Clothing	Cole Camp, MO	Mr. Raymond Eckhoff	668-4707	Yes	4	9-12	No
Essers	18 S. Jefferson Marshall, MO	Mr. David Esser	886-2107	No	0	7-12	Yes
Estes' 66 Station	Warsaw, MO	Mr. Gary Estes	438-6022	No	0	0	Possibly
Farmer's Bank of Lincoln	Lincoln, MO	Mr. Karl Kroenke	547-3311	Yes	4-5	9-12	Possibly
Farmer's Insurance	1806 W. 11th Sedalia, MO	Mr. Newby	827-0122	Yes	1-5	9-12	Possibly

NAME	ADDRESS	CONTACT REPRESENTATIVE	TELEPHONE	FIELD TRIP	GROUP SIZE	GRADE LEVEL	GUEST SPEAKER
Fire Station	211 S. Kentucky Sedalia, MO	Mr. Jabas	826-8044	Yes	1-15	0	Possibly
Flat Creek Vet. Hosp.	1701 W. Main Sedalia, MO	Dr. Peacock	827-2057	Yes	10-15	K-12	Yes
Gambles	2 S. Jefferson Marshall, MO	Mr. Norvelle Brown	886-6823	No	0	7-12	Yes
Bill Greer Body Shop	Main Street Sedalia, MO	Mr. Orval Burd	827-2162	Yes	5	10-12	No
Hallmark	25th & McGee Kansas City, MO	Ms. Rose A. Lightle	274-4667	Yes	20	11-16	Yes
Harris & Reid	Farmer's Savings Bank Marshall, MO	Mr. Mike Reid	886-5544	No	0	7-12	Yes
Heinzler Bros. Welding	Marshall, MO	Mr. Frank Heinzler	886-7775	Yes	20-25	7-9	No
Holiday Inn	32nd & Limit Sedalia, MO	Mr. Jim Grieshaber	826-6100	Yes	40-50	8-9	Possibly
Home Lumber	207 E. North Marshall, MO	Mr. Roland Wood	886-3342	No	0	7-12	Yes
Horse Racing	P.O. Box 951 Sedalia, MO	Mr. Anderson	826-7114	Yes	1-10	9-12	Possibly
Howard Construction	1509 N. Ohio Sedalia, MO	Mr. Olen Howard	826-5750	Yes	5-15	8-12	No
Hurtt's Pharmacy	504 W. 16th Sedalia, MO	Mr. Hurtt	826-2872	Yes	1-10	8-12	Possibly
IBEW Local 814 Credit Union	2111 W. Broadway Sedalia, MO	Ms. June Kuhlman	826-0814	Yes	6 at a time	8-12	Possibly
IGA	2402 W. Broadway Sedalia, MO	Mr. Ralph Huff	827-1452	Yes	25	K-12	Yes

NAME	ADDRESS	CONTACT REPRESENTATIVE	TELEPHONE	FIELD TRIP	GROUP SIZE	GRADE LEVEL	GUEST SPEAKER
Industrial Loan & Investment	120 W. Fifth Sedalia, MO	Mr. Firman Boul	826-4800	Yes	25	7-12	Yes
J & J's	1421 S. Limit Sedalia, MO	Mr. Jack Smith	827-2485	No	0	0	Possibly
Jack Couts' Running Quarter Horses	Mo. State Fair Grounds Sedalia, MO	Ms. Tina Brown	826-1135	Yes	5-10	K-12	No
Jim's Garden Center	1000 W. Main Sedalia, MO	Mr. James L. Foster	826-4411	Yes	15	4-9	Possibly
Bob Johnson TV & Appliance	2907 W. Broadway Sedalia, MO	Mr. Ray Thompson Mr. Paul Johnson	827-2326	Yes	15-20	7-12	Yes
KDRO Radio	West Highway 50 Sedalia, MO	Mr. Herb Brandes	826-5005	Yes	15	K-12	Possibly
Keeharts	Marshall, MO	Ms. Alice Alexander	886-5611	No	0	7-12	Yes
Kim Originals	2500 E. Broadway Sedalia, MO	Mr. Bill Cline	826-2500	Yes	15	K-12	Possibly
Kings Court	Marshall, MO	Mr. Bill Coman	886-5444	Yes	15	7-12	No
KMMO-KMFL	Highway 65 North Marshall, MO	Mr. Harold Douglas Mr. Jim Athon Mr. Jack Abdon	886-7422	No	0	7-12	Yes
KMOS TV Station	2100 W. Broadway Sedalia, MO	Mr. Stuart Gressley	826-1651	Yes	15	K-12	Yes
KSIS Radio	North 65 Highway Sedalia, MO	Mr. Carl Yates	826-1050	Yes	10	K-14	Yes
Lacuma Builders, Inc.	2800 W. Main Sedalia, MO	Mr. Bob Cook	826-0522	No	0	0	Yes

NAME	ADDRESS	CONTACT REPRESENTATIVE	TELEPHONE	FIELD TRIP	GROUP SIZE	GRADE LEVEL	GUEST SPEAKER
Lamm, Barnett, Crawford, Barnes, Fritz Law Firm	118 W. Fifth Sedalia, MO	Mr. Donald Barnes	826-5428	No	0	11-12	Yes
Lee's Archery Manufacturing	Route 2 Sedalia, MO	Mr. LeRoy Young	826-6762	Yes	20	7-16	No
Lee's Studio	20 S. Jefferson Marshall, MO	Mr. Lee Beardon	886-7313	No	0	7-12	Yes
Lifeguard	2401 W. Second Sedalia, MO	Ms. Diane Cordry	826-7719	No	1-15	8-10	Yes
Lincoln New Era Newspaper	Lincoln, MO	Mr. George Williams	547-3800	Yes	Inquire	Inquire	Possibly
Locker Plant	Hughesville, MO	Mr. Bill Wheeler	826-8630	Yes	10-15	1-12	Yes
Macy's	1034 Main Kansas City, MO	Mrs. Cullen	221-3737	Yes	20	11-16	No
Magistrate Judge--Pettis County	901 S. Vermont Sedalia, MO	Ms. Hazel Palmer	826-8816	No	0	11-12	Yes
Marshall Chamber of Commerce	214 N. Lafayette Marshall, MO	Mr. Leo Hayob	886-7464	No	0	7-12	Yes
Marshall Floral & Greenhouse	160 W. Summit, Marshall, MO	Ms. Juanita Dametz	886-7177	Yes	20	7-9	Yes
Marshall Police	Arrow Street Marshall, MO	Mr. Gerald Stone	886-7411	Yes	15-20	1-12	Yes
Marshall Public Schools	565 S. Odell Marshall, MO	Dr. John Payne	886-2244	Yes	20-30	7-12	Yes
Martin Lumber	Hughesville, MO	Mr. Con Scott	826-7556	No	0	0	No
Mattingly's Variety Store	218 S. Ohio Sedalia, MO	Mr. Bill Stratton	826-5270	Yes	20	7-12	Possibly

NAME	ADDRESS	CONTACT REPRESENTATIVE	TELEPHONE	FIELD TRIP	GROUP SIZE	GRADE LEVEL	GUEST SPEAKER
Merle Norman Cosmetics	120 S. Ohio Sedalia, MO	Ms. Sandra Boul	826-6430	No	0	11-16	Yes
MFA Elevator	Cole Camp, MO	Mr. Ed Schnakenberg	668-3231	Yes	6-8	9-10	Possibly
MFA Grocery	Lincoln, MO	Mr. Joe McKnight	547-3621	No	0	0	Yes
MFA Implement	Lincoln, MO	Mr. Clarence Frisch	547-3318	Yes	4	9-12	No
MFA Insurance	1817 W. Broadway Columbia, MO	Mr. Vic Ohman	445-8441	Yes	20	11-16	No
Missouri Division of E. S.	215 E. Fifth Sedalia, MO	Mr. Bill Giles	826-8184	Yes	25	11-12	Yes
Missouri Pacific Railroad	210 N. 13th St. St. Louis, MO	Mr. D. M. Tutke	314-2944	Yes	Arr.	7-12	Possibly
Missouri State Bank	917 S. Limit Sedalia, MO	Mr. William Claycomb	826-1213	Yes	20-25	4-12	Possibly
Missouri State Fair	Box 111 Sedalia, MO	Ms. Myrna Ragar	826-0570	Yes	30	3-7	Possibly
Missouri Valley College	Marshall, MO	Mr. Ed Leslie	886-6924	No	0	9-12	Yes
Model Cleaners	Warsaw, MO	Mr. Richard Kingma	438-5831	Yes	20	K-12	No
Ollison's Garage	2809 E. 12th Sedalia, MO	Mr. Keith Ollison	826-4077	No	0	0	Yes
Otten Truckline	Cole Camp, MO	Mr. Pete Otten	668-3112	No	0	0	Yes
Patricia Stephens Modeling Finishing School	4638 Nichols Parkway Kansas City, MO	Ms. Sue Peterson	531-5866	Yes	60	7-12	Yes
Pepsi-Cola Bottling Co.	Sedalia, MO	Mr. W. C. Ream	826-8144	Yes	30	4-9	Possibly

NAME	ADDRESS	CONTACT REPRESENTATIVE	TELEPHONE	FIELD TRIP	GROUP SIZE	GRADE LEVEL	GUEST SPEAKER
Pettis County Ambulance	626 E. Fifth Sedalia, MO	Mr. Joe Wasson	826-5316	Yes	10-15	6-12	Possibly
Phyllis's Beauty Shop	Cole Camp, MO	Ms. Phyllis Templeton	668-3750	Yes	6	9-12	No
Pittsburgh Corning	16th & Missouri Pacific Spur Sedalia, MO	Ms. Rita Kenney	826-4660	No	0	0	No
Post Office	205 N. Lafayette Marshall, MO	Mr. Weislocker	886-6200	Yes	25	7-9	No
Post Office	405 E. Fifth Sedalia, MO	Mr. Roy Hinton	826-8887	Yes	25-30	4-9	Possibly
Quality Body Shop	501 N. Park Sedalia, MO	Mr. Bill Utz	826-2126	Yes	1-10	8-12	No
Rainbow Radio & TV	Lincoln, MO	Mr. Rainbow	547-3317	Yes	4	9-12	No
Ramada Inn	3501 W. Broadway Sedalia, MO	Mr. Darrell Olsen	826-8400	Yes	15	5-12	Possibly
Reinhart Fajen, Inc.	Warsaw, MO	Ms. Eloise Atkins	438-5111	Yes	8-10	9-12	Possibly
Rest Haven Retirement Home	1800 S. Ingram Sedalia, MO		827-0845	Yes	10	1-9	Possibly
Retail Bakery	Sixth & Ohio Sedalia, MO	Mr. Mallory	826-6920	Yes	20	K-9	Possibly
Rick's Body Shop	R. R. #2 Sedalia, MO	Mr. Rick Geer	826-1157	Yes	25-30	7-12	No
Rival Manufacturing Co.	16th & Lamine Sedalia, MO	Mr. Jim Houchen	826-6600	Yes	15	4-12	Yes

NAME	ADDRESS	CONTACT REPRESENTATIVE	TELEPHONE	FIELD TRIP	GROUP SIZE	GRADE LEVEL	GUEST SPEAKER
Rival Manufacturing Co.	Miller's Park Plaza Sedalia, MO	Ms. Nyra Price	827-3860	No	0	0	Yes
Rose & Buckner	72 N. Jefferson Marshall, MO	Mr. Bob Rose	886-2002	Yes	15-20	7-12	Yes
Russell Brothers	Marshall, MO	Mr. Casey Kotowiez	886-7340	No	0	7-12	Yes
Russell Brothers	214 S. Ohio Sedalia, MO	Mr. Bob Johnson	826-5154	Yes	1-10	8-12	No
Scott's Jewelry	East Highway 7 Marshall, MO	Mr. Scott	438-5700	No	0	0	Possibly
Sears	110 W. Third Sedalia, MO	Mr. Finis Galloway	826-6500	Yes	10	7-12	Yes
Sedalia Computer Service	210 E. 7th Sedalia, MO	Mr. Larry McRoy	827-1990	Yes	10-15	9-12	Yes
Sedalia Democrat-Capital	700 S. Massachusetts Sedalia, MO	Mr. Don Keller	826-1000	Yes	15	K-16	No
Sedalia Implement Co.	2205 S. Limit Sedalia, MO	Mr. John Joy	826-0466	Yes	15-25	7-12	Yes
Sedalia Memorial Airport	East Highway 50 Sedalia, MO	Mr. James Addas	826-9796	Yes	Small	K-14	Possibly
Sedalia Police Department	3rd & Osage Sedalia, MO	Mr. Bill Miller	826-0214	Yes	10-15	1-14	Yes
Sedalia Water Department	111 W. Fourth Sedalia, MO	Mr. C. H. Taylor	826-1234	Yes	15	6-9	Possibly
Sheriff's Department	Warsaw, MO	Mr. Bob Breshears	438-5252	No	0	0	No

NAME	ADDRESS	CONTACT REPRESENTATIVE	TELEPHONE	FIELD TRIP	GROUP SIZE	GRADE LEVEL	GUEST SPEAKER
Paul Shinn Oil Company	RFD 3 Warsaw, MO	Mr. Paul Shinn	438-5013	No	0	0	No
Sho-Me Stables	State Fair Grounds Sedalia, MO	Ms. Elaine Knight	827-2243	Yes	5-10	K-12	No
Sound Shop	1716 W. Ninth Sedalia, MO	Mr. Al Reese	827-2223	Yes	20	K-12	Yes
Southwestern Bell Telephone	220 E. 5th St. Sedalia, MO	Mr. Bob Johnson	826-9800	Yes	25	K-12	Yes
Sowers' Horses	Callis Stables Sedalia, MO	Ms. Susan Sowers	827-1778	Yes	5-10	8-12	Yes
Stan's TV	P.O. Box 856, Rt. 2 Warsaw, MO	Mr. Stan Johnson	438-6859	No	1	9-10	Yes
State Fair Community College	1900 Clarendon Road Sedalia, MO	Mr. Fred Davis	826-7100	Yes Check with Betty Blackwell	5-10	9-12	Yes
State Fair Riding Academy	Route 3 Sedalia, MO	Ms. Faith Lovell	826-9767	Yes	1-5	8-12	No
T & O Phosphate	Hughesville, MO	Mr. Larry Owen	826-1813	No	0	0	No
The Craft Shop	318 S. Ohio Sedalia, MO	Mrs. Boatman	827-3041	Yes	15-20	5-12	Possibly
The Dog House	116 W. 16th Sedalia, MO	Mr. Antoine	827-1941	Yes	1-10	8-12	No
Third National Bank	301 S. Ohio Sedalia, MO	Mr. Bob McDonald	826-0611	Yes	30-40	6-9	Possibly
Town and Country Shoes	201 N. Missouri Sedalia, MO	Mr. Charles Rayl Mr. Ken Grott	826-4490	Yes	Small	K-12	Yes

NAME	ADDRESS	CONTACT REPRESENTATIVE	TELEPHONE	FIELD TRIP	GROUP SIZE	GRADE LEVEL	GUEST SPEAKER
Tullis Hall Dairy Co.	541 E. Fifth Sedalia, MO	Mr. Funnell	826-3030	Yes	10	3-12	No
Tygart & Arth Body Shop	207 E. Belle Marshall, MO	Mr. Ray Arth	886-3033	Yes	25	7-8	Yes
Unitog	Warsaw, MO	Mr. Osborne McMillen	438-5117	Yes	Arr.	7-12	No
Verl's Amoco Service	1801 W. Broadway Sedalia, MO	Mr. Verl Schnepf	827-0040	Yes	1-10	8-12	No
Veterinary	Cole Camp, MO	Dr. Taylor	668-4523	No	0	0	No
Viebrocks Welding	Cole Camp, MO	Mr. Harold Viebrock	668-3233	Yes			No
Vogue Styles	22 Jefferson Marshall, MO	Mrs. Howell	886-6161	No	0	7-12	Yes
W-K Chevrolet Garage	Cole Camp, MO	Mr. Vern Dean	668-4421	Yes	4-6	9-12	Possibly
Walker Publishing Co.	2016 W. Main Sedalia, MO	Mr. Mark Kitch	826-8200	Yes	15	5-12	Yes
Warren Grocery	Green Ridge, MO	Mr. Warren	527-3317	No	0	0	No
Warsaw Auto Supply	Warsaw, MO	Mr. Stan Intelman	438-7321	Yes	Small	1-14	No
Warsaw Sewing Center	Warsaw, MO	Mr. Jerome Kelly Mr. Donald Prunty	438-6919	Yes	6	8-12	Possibly
Warsaw Veterinary Clinic	Warsaw, MO	Dr. N. V. Roff	438-7333	Yes	8	8-12	Yes
WESCEMO, Inc.	651 E. 14th Sedalia, MO	Mr. Steve Laslo	827-3760	No	0	8-12	Yes
Western Auto	Jefferson & Morgan Marshall, MO	Mr. Gerald Leach	886-6813	No	0	7-12	No
Wilken Music	Thompson Hills Sedalia, MO	Mr. Wilken	826-9356	Yes	10	4-12	Yes

NAME	ADDRESS	CONTACT REPRESENTATIVE	TELEPHONE	FIELD TRIP	GROUP SIZE	GRADE LEVEL	GUEST SPEAKER
Williams Press	Cole Camp, MO	Mr. George Williams	668-4418 547-3911	Yes	4-6	9-12	Possibly
Wilson's Company, Inc.	Box 340 Marshall, MO	Mr. Don Nutten	886-5522	Possibly	12	7-12	Possibly
Wood & Huston Bank	27 North Street Marshall, MO	Mr. Mitchell	886-5575	Yes	25	7-9	Yes
Yeager's Cycle Sales	3001 S. Limit Sedalia, MO	Mr. Rick Yeager	826-2925	Yes	1-15	8-12	No
Yost Chevrolet	Odell Avenue Marshall, MO	Mr. Ken Yost	886-3348	No	0	7-12	Yes